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RUSSIA.

THE CAUCASUS.[a]

By Boris M. Balevsky, Russian Division, Bureau of Foreign and Domestic Commerce, September 1, 1919.

The Caucasus is situated between 38° and 47° north latitude and 38° and 50° longitude east of Greenwich. On the north it is bounded by the Don Cossack district and the Government of Astrakhan; on the south by eastern Turkey and Persia; on the east by the Caspian Sea; and on the west by the Black Sea. It is divided by the chain of the Caucasus Mountains into North Caucasus and Transcaucasia. The total area of the Caucasus is 181,173 square miles. The Caucasian mountain chain stretches from the Black Sea to the Caspian Sea, and is about 1,000 miles in length. The central chain from the mountain of Elbruz to Kazbek is about 130 miles long and in some places about 18,000 feet high. The highest peaks are Elbruz (18,470 feet), Kazbek (16,346 feet), Dykhtau (17,054 feet), and Tetnuld, with two summits (15,919 and 15.935 feet). The chain is intersected by four passes, the largest among them being the Georgian military road between Tiflis and Vladikavkaz.

There are 982 glaciers on the north slope of the Caucasian chain, with a surface of 1,288 square versts (567 square miles), and 407 on the south slope with a total surface of 441 square versts (194 square miles). The most prominent are Gerget, 6 or 7 versts (approximately 4 miles) from the station Kazbek; Devdorak, 16 versts (11 miles) from the station of the same name; and Tzei on the Military Osetin Road.

Lakes are numerous in the Caucasus. Many of them—some of fresh water and some of salt water—are situated high above the sea level. The largest lake in the Caucasus is Goktcha Lake (67 versts long and 30 versts wide, or 44 by 20 miles), into which 29 rivers flow and out of which flows the Zanga, tributary to the Aras River.

Among the rivers the most prominent are the Kuban, 420 miles long; the Ingus and Rion, 200 miles; the Terek, 350 miles; the Kura, 690 miles; and the Aras, 520 miles.

[a] The material for this survey of the Caucasus was compiled from reports of American consular officers; from official and unofficial publications in Russian, including The Mining Industry (authorized by the Russian Mining Department), Guide to the Caucasus, Suvorin's Russian Calendar (1917), and the tenth yearbook of agricultural statistics (published by the Russian Department of Agriculture in 1917); and from the following sources in English: Ghambashidze's The Caucasus and The Caucasian Petroleum Industry (pamphlets, 1918) and Mineral Resources of Georgia and Caucasia (1919); Russian Yearbook (London, 1916); Goldstein's Russia: Her Economic Past and Future (1919); Raffalovich's Russia: Its Trade and Commerce (1918); Russia, a periodical issued at 24 State Street, New York; The Mineral Industry during 1917, edited by G. A. Roush; and publications of the United States Geological Survey on various minerals.

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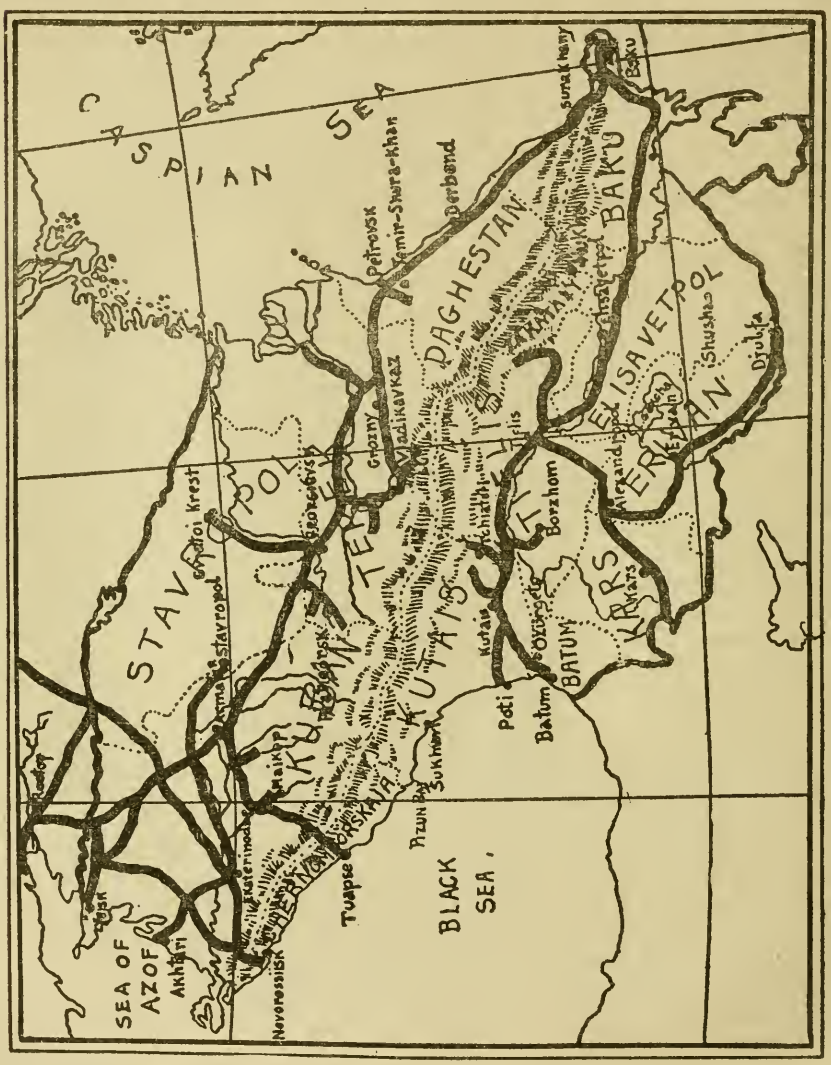
On the old border of Russia, Turkey, and Persia there rises the solitary Bible mountain Ararat in the shape of two conical peaks, Large and Small Ararat. The distance between them is about 10 versts (7 miles). The height of the former is 16,916 feet and of the latter, 12,840 feet.



The Black Sea coast of the Caucasus is about 650 versts (433 miles) long, and only five bays along this coast can be considered suitable for the establishment of ports. These bays are Novorossiisk, Gelendzhik, Pizun, Sukhum, and Batum. In autumn and winter the Black Sea is very rough and navigation is difficult. The Caspian coast has no bays of any importance, with the exception of Baku Bay and its natural port of Baku.

The climate of the Caucasus is very varied, owing to the vertical configuration of its surface and the unequal fall of rain. For instance, at Sotchi, on the Black Sea, the rainfall is 3,000 millimeters (1 millimeter=0.03937 inch) and at Baku 241 millimeters per annum. In the western part of the Caucasus the climate is subtropical; in the eastern part dry, owing to the influence of the winds from the Transcaspian district. Under the protection of the Caucasus Mountains and plenty of moisture there is very rich vegetation, and at a height of 4,000 feet there are forests of oak, beech, chestnut, boxwood, etc. In Transcaucasia the vegetation is of the same character as in Asia Minor and along the shores of the Mediterranean. Along the Black Sea shore and around Batum are grown oranges, lemons, bamboo, cork trees, etc. At a height of 9,400 feet there are wonderful rhododendrons, and Alpine grass is met even at a height of 11,500 feet.

Among the animals, bears are common, and near Lenkoran, on the Caspian Sea, there are even panthers and tigers. In the high mountains there are still to be met bison, wild goats, hogs, foxes, reindeer, antelopes, etc. Along the River Rion, in the western part of Georgia, there is an abundance of pheasants. Altogether there are 400 varieties of birds.

Population.

The population of the Caucasus in 1915 was 13,229,100, 14.8 per cent of whom lived in cities and towns and 85.2 per cent in villages. The density was 32.1 persons per square verst (0.44 mile). The different races in the Caucasus are Georgians; Russians (chiefly Cossacks in the northern part); Circassians, Lesgians and Chechenz, Ossetians, Nogais, Kalmucks, and Ingushes among the Caucasian mountaineers; and Armenians, Tatars, Persians, Germans, Greeks, and Jews.

The following table, taken from the Statesman's Yearbook, shows the area, population, and density of population in the different Governments and Provinces of the Caucasus on January 1, 1915:

Governments and provinces.	Area.	Population Jan. 1, 1915.	Density per square mile.
	Square miles.		
North Caucasus:			
Kuban (province)	36,645	3,051,200	83
Stavropol	20,970	1,353,500	65
Terek (province)	28,153	1,314,900	47
Total, North Caucasus	85,768	5,719,600	66
Transcaucasia:			
Baku	15,061	1,119,600	75
Batum (province)	2,693	186,000	69
Black Sea (Tchernomorla)	3,220	201,800	63
Daghestan (province)	11,471	732,600	64
Elisavetpol	16,991	1,117,200	66
Erivan	10,725	1,034,800	96
Kars (province)	7,239	403,000	56
Kutais	8,145	1,070,300	130
Sukhum (district)	2,515	147,600	58
Tiflis	15,776	1,394,800	88
Zakataly (district)	1,539	101,800	66
Total, Transcaucasia	95,405	7,509,500	79
Total, Caucasus	181,173	13,229,100	73

Public Instruction.

Progress is being made in public education in the Caucasus. Here, as in all parts of Russia, public instruction is in the hands of or is directly controlled by the State. The secondary educational system in the Caucasus at the beginning of 1912 consisted of 106 secondary State schools or gymnasia, progymnasia, and nonclassical schools. The largest number (27) of these schools were in the Province of Kuban in North Caucasus, and the smallest number in the Province of Kars, where there were only two. Nine similar schools were added to this number during the same year. A little more than half of all the schools are for girls. At the beginning of 1912 there were also 180 private schools, and during the year permits were granted to open 44 new ones.

The total number of elementary schools in the Caucasus at the beginning of 1912 was 3,214, and 418 more were added during the year. These schools were insufficient for the increasing population, and a considerable addition to them was contemplated. Additional grants were made by the Ministry of Public Education and by the zemstvos in the Caucasus, to be apportioned among the different Governments and Provinces according to the population.

Besides the foregoing schools, there were also 40 schools for the training of teachers, and two others were added during the year. There were 24 industrial schools. During the year surveying and general technical classes were opened at the Baku Industrial School, and it was planned to equip a section there in 1913 for training motor-car drivers.

Much attention was paid during 1912 to the introduction of a system for training teachers in various kinds of manual work. Classes were formed for the theoretical and practical study of agriculture, for studying the preservation of fruit, for culinary instruction, and for needlework. Specialists were invited to give practical instruction to teachers in the various branches of industries, and funds were granted by the zemstvos to enable teachers to visit industrial schools and there acquire practical knowledge. Classes were also formed in physical culture and a two months' course for men and women instructors was opened at Tiflis.

The number of schools and pupils during 1913 in North Caucasus and Transcaucasia was as follows:

Geographical divisions.	Schools.	Pupils.		
		Boys.	Girls.	Total.
North Caucasus	3,938	199,439	103,201	302,640
Transcaucasia	2,965	132,904	41,815	174,719
Total, Caucasus	6,903	332,343	145,016	477,359

Area and Production of Principal Cereals.

Agriculture is the chief occupation of the inhabitants of the Caucasus.

The following table shows the annual average area under wheat, rye, barley, corn, and oats in the Caucasus for the years 1911 to 1915. The area is stated in dessiatines, equivalent to 2.7 acres.

Cereals.	North Caucasus.	Trans-caucasia.	Total, Caucasus.
Wheat:	*Dessiatines.*	*Dessiatines.*	*Dessiatines.*
Winter	2,488,512	642,540	3,131,052
Spring	1,261,241	337,383	1,598,627
Total, wheat	3,749,756	979,923	4,729,679
Rye:			
Winter	164,831	26,332	191,163
Spring	7,397	6,235	13,632
Total, rye	172,228	32,567	204,795
Millet	360,254	20,718	380,972
Barley	1,545,647	481,399	2,027,046
Corn	296,223	303,080	599,303
Oats	116,016	12,325	428,341
All other cereals	11,127	15,221	26,348
Total	6,551,251	1,845,233	8,396,484

The following table shows the annual average cereal crops of the Caucasus for 1911–1915. Quantities are stated in poods of 36.1128 pounds avoirdupois.

Cereals.	North Caucasus.	Trans-caucasia.	Total, Caucasus.
Wheat:	*Poods.*	*Poods.*	*Poods.*
Winter	134,541,000	28,133,000	162,674,000
Spring	64,174,000	13,504,000	77,678,000
Total, wheat	198,715,000	41,637,000	240,352,000
Rye:			
Winter	8,890,000	1,077,000	9,967,000
Spring	408,000	232,000	640,000
Total, rye	9,298,000	1,309,000	10,607,000
Millet	18,102,000	826,000	18,928,000
Barley	97,295,000	22,097,000	119,392,000
Corn	25,291,000	14,088,000	39,379,000
Oats	24,658,000	620,000	25,278,000
All other cereals	584,000	641,000	1,228,000
Total	373,943,000	81,221,000	455,164,000

The Caucasus produces about 18 per cent of the total of Russia's wheat, 18 per cent of its barley, and 29 per cent of its corn.

The relative distribution of the various cereals in the Caucasus for the period 1911–1915 is as follows: Wheat, 52.8 per cent; rye, 2.33 per cent; millet, 4.16 per cent; barley, 26.23 per cent; corn, 8.65 per cent; oats, 5.56 per cent; other crops, 0.27 per cent.

Area and Production of Rice.

The following table shows the area under rice in the Caucasus, the producton, and the production per dessiatine from 1911 to 1915:

Items.	Average, 1911 1915.	1911	1912	1913	1914	1915
Area in dessiatines:						
North Caucasus	644	.....	1,084	486	535	472
Transcaucasia	25,733	32,320	21,917	26,056	31,320	17,052
Total, Caucasus	26,248	32,320	23,001	26,542	31,855	17,521
Production in poods:						
North Caucasus	40,400	.....	68,800	25,300	32,700	34,600
Transcaucasia	1,675,700	2,115,500	1,557,100	1,557,600	1,760,600	1,387,700
Total, Caucasus	1,708,000	2,115,500	1,625,900	1,582,900	1,793,300	1,422,300
Production per dessiatine in poods:						
North Caucasus	62	.....	63	52	61	73
Transcaucasia	67	65	71	60	56	81
Total, Caucasus	65	65	67	56	59	77

Transcaucasian Cotton Area and Yield.

The figures given below, compiled by the Caucasian Society of Rural Economy, show the area under cotton in the Governments of Transcaucasia from 1910 to 1915:

Years.	Erivan.	Elisavetpol.	Baku.	Tiflis.	Kutais.	Total.
	Dessiatines.	*Dessiatines.*	*Dessiatines.*	*Dessiatines.*	*Dessiatines.*	*Dessiatines.*
1910	35,000	26,600	12,200	1,600	1,800	77,170
1911	40,400	53,300	23,600	5,000	2,700	125,050
1912	36,200	46,650	21,450	5,370	2,780	112,550
1913	38,300	50,800	30,900	5,100	2,400	127,500
1914	44,000	53,000	40,000	8,200	3,700	148,900
1915	35,200	42,400	32,000	4,100	1,800	115,500

The area cultivated in 1916 was about 87,000 dessiatines, a decrease of 25 per cent from the 1915 figures and of 40 per cent from those of 1914. The causes of the decrease are said to be dearness of labor, lack of seeds, disorganization of transport facilities, and fixed Government prices. According to the Torgovo Promyshlennaya Gazeta (No. 28, May 28, 1918), the area for 1917 further declined to about 52,700 dessiatines.

Notwithstanding the decrease in area in 1916, the fiber crop for that year was only a little below that of the preceding year. The following table shows the area under cotton and the crop in the Governments of Transcaucasia in 1915 and 1916 and the percentage of fiber obtained in 1916:

Governments.	Area.		Crop.		Per cent of fiber in 1916.
	1915	1916	1915	1916	
	Dessiatines.	*Dessiatines.*	*Poods.*	*Poods.*	
Erivan	35,200	23,500-30,000	382,000	352,500- 450,000	29.5
Elisavetpol	42,400	28,300-34,000	530,000	430,000- 516,800	29.3
Baku	32,000	24,000-27,000	565,000	430,000- 494,000	30.3
Tiflis	4,100	2,000- 1,000	10,750	19,000- 30,000	30.3
Kutais	1,800	1,500	20,100	24,700- 27,000	27.3
Total	115,500	79,300-93,500	1,516,850	1,2 5,2[illegible]0-1,526,800	.....

Importance of Silk Production.

Silk production is one of the most prominent of all branches of agriculture in Transcaucasia. According to official statistics, 400,000 families, or 2,000,000 persons, scattered over 3,000 villages, are engaged in the cultivation of silk cocoons. The annual production is estimated at 11,000,000 to 13,000,000 pounds and is valued at $2,300,000 to $3,000,000. The following figures, compiled by the Sericulture Society of the Caucasus, give the production and prices of cocoons in this district for the six years from 1909 to 1914:

Years.	Production.	Prices per pound.	
		Green cocoons.	Dry cocoons.
	Pounds.		
1909	10,833,000	$0.20-$0.22	$0.64-$0.70
1910	12,999,600	.22- .23	.66- .74
1911	11,555,200	.23- .24	.62- .69
1912	10,291,350	.17- .19	.54- .62
1913	10,110,800	.20- .23	.92- 1.03
1914	11,555,200	.24- .29	.86- .93

Tobacco Cultivation.

In the Caucasus there is cultivated high-grade tobacco raised from Turkish seed. It is worth noting that the popular Russian cigarettes are all manufactured from Caucasian tobacco. Of the total area under high-grade Turkish tobacco in the former Russian Empire in 1913 (27,027 dessiatines), 18,808 dessiatines, or 69 per cent, was in the Caucasus, chiefly in the following districts: Sukhum, 8,037 dessiatines, or 30 per cent of the total; Kuban, 7,678 dessiatines, or 28 per cent; Black Sea Government, 3,093 dessiatines, or 11 per cent. The crop in 1913 was 584,530 poods in Kuban and 442,830 poods in Sukhum—a total of 1,027,360 poods, out of a total for the Empire of 1,489,211 poods.

The following table shows the number and average size of the tobacco plantations, the area cultivated, and the crop for the years 1911 to 1915, and the average for this five-year period:

Years.	Number of plantations.	Area cultivated.	Average size of plantations.	Crop.	Yield per dessiatine.
		Dessiatines.	*Dessiatines.*	*Poods.*	*Poods.*
1911	25,945	24,190	0.955	1,68.,949	70
1912	24,023	20,104	.837	1,230,869	61
1913	23,747	20,917	.881	1,364,800	65
1914	29,977	32,236	1.0.5	2,026,089	63
1915	30,230	31,371	1.038	2,135,8.4	68
Average, 1911-1915	26,784	25,764	.957	1,689,116	65

In the following table the average annual figures pertaining to tobacco cultivation in the Caucasus during the period 1911–1915 are given by geographical divisions:

Geographical divisions.	Average number of plantations.	Average area cultivated.	Average size of plantation.	Average crop.	Average crop per dessiatine.
		Dessiatines.	*Dessiatines.*	*Poods.*	*Poods.*
Kuban	4,264	11,017	2.590	860,357	77
Terek	83	4	.047	.....	.....
Black Sea Government	2,419	3,194	1.575	178,556	56
Baku	3,222	35	.056	3,155	91
Tiflis	1,756	1,041	.590	80,003	75
Kutais	4,789	354	.075	17,334	49
Batum	2,928	548	.320	42,576	88
Sukhum	7,584	9,033	1.194	464,858	52
Erivan	1,016	149	.143	4,643	32
Elisavetpol	340	133	.391	13,286	102
Kars	122	6	.043	587	96
Daghestan	660	6	.010	643	117
Zakataly	163	242	1.434	22,774	91
Caucasus—Average for 1911-1915	26,784	25,764	.957	1,689,116	65

Area Under Vines and Grape Production.

In 1913 about 210,000 small peasant proprietors cultivated 190,000 acres of vineyards in the Caucasus, and 40,000,000 gallons of wine were produced. The quality of the wine is excellent, and in those cases where modern chemistry was applied it was said to be as good as that of the French and Italian wines.

The following table shows the area of vineyards and the grape crops in the Caucasus for 1915, so far as returns are available:

Geographical divisions.	Area of vineyards.	Crop of grapes.
North Caucasus:	*Dessiatines.*	*Poods.*
Stavropol	5,517	232,200
Kuban	7,106	(a)
Black Sea Government	3,000	600,000
Terek	10,850	1,942,600
Total, North Caucasus	26,503	.....
Transcaucasia:		
Kutais	31,424	(a)
Sukhum	3,098	(a)
Batum	1,459	(a)
Tiflis	32,485	(a)
Zakataly	777	255,700
Baku	11,675	1,050,000
Daghestan	3,500	787,500
Erivan	11,252	774,400
Elisavetpol	16,485	(a)
Kars	16	100
Total, Transcaucasia	112,182	.....
Total, Caucasus	138,685	.....

a No figures available.

Tea Production Small but Capable of Expansion.

Around Batum, on the Black Sea, there are tea plantations, and a few are located in the Government of Kutais. In 1895 there were only 6 acres; in 1913 there were 2,210 acres; and in 1914, 2,270 acres. In 1895 only 85 pounds of leaf were obtained; in 1913, 1,220,000 pounds; and in 1914, 1,245,000 pounds. In 1895, 20 pounds of tea were produced; in 1913, 287,000 pounds; and in 1914, 300,000 pounds. This branch of cultivation is still in the experimental stage, but there are great possibilities for expanding it in the near future.

Sunflowers and the Sunflower-Oil Industry.

Sunflowers are raised chiefly in the Kuban Province, North Caucasus. The following table gives the acreage and crop of sunflowers in Kuban and Stavropol, North Caucasus, in 1914 and 1915:

Geographical divisions.	Area.		Crop.		Poods per dessiatine.	
	1914	1915	1914	1915	1914	1915
	Dessiatines.	*Dessiatines.*	*Poods.*	*Poods.*		
Kuban	272,568	236,087	21,073,855	15,155,785	77	64
Stavropol	6,741	8,162	402,838	459,170	60	56
Total, North Caucasus	279,309	244,249	21,476,693	15,614,955	77	64

According to official statistics, states an article in "Russia," during the year 1915 about 15,000,000 poods of sunflower seed was collected and utilized by over 600 oil-producing works. As a general rule they are small and run by peasants themselves, but a strong tendency to enlarge and improve them is now apparent. At Ekaterinodar, which is the center of the Kuban district, there are three large oil works, each with an annual output of 650,000 rubles. There

are also very large works at Rostof and Armavir. The shells and refuse of the seeds are made into briquettes and used as fuel. In connection with the strong development of the oil industry, German merchants erected large works in 1907 to produce the machinery needed. Oil presses were brought from Germany, knocked down, and parts were manufactured at Taganrog. This experiment was very successful, and was carried out by the firm of Kerber & Co. In many cases the oil-producing business can be worked in conjunction with the manufacture of potash and soap powder.

Flax and Hemp.

The following table shows the area sown to flax and the crop of flax seed in the Caucasus for 1913, 1914, and 1915, and the average for 1911–1915:

Years.	Dessiatines.	Poods.	Years.	Dessiatines.	Poods.
Average, 1911–1915	51,756	1,437,900	1914	74,716	2,341,300
1913	62,435	1,243,800	1915	22,467	924,100

The following table shows the area and production of hemp fiber and hemp seed in the Caucasus from 1911 to 1915, together with the annual average for those years:

Years.	Hemp fiber.			Hemp seed.	
	Dessiatines.	Poods.	Poods per dessiatine.	Dessiatines.	Poods.
Average, 1911–1915	6,972	210,600	30.9	7,385	206,400
1911	8,780	267,100	30.4	(a)	(a)
1912	6,571	160,700	24.5	(a)	(a)
1913	8,030	282,700	35.2	8,566	238,800
1914	6,066	159,600	30.8	6,520	161,600
1915	5,415	182,800	33.8	5,605	213,200

a No figures available.

Beekeeping—Domestic Animals.

Beekeeping is one of the ancient occupations in the Caucasus. In 1912 there were about 26,067 apiaries, with 596,924 beehives, and the production amounted to 5,653,302 pounds of honey and 656,820 pounds of wax. It is worth noting that the Russian Holy Synod did not give a chance to the Georgian Church to develop this minor industry very considerably. Had the reverse been the case, the Caucasus could have supplied the demands of the churches all over Russia for wax for candles. But considerable quantities of so-called wax (actually ceresin) have been imported.

In 1914 the numbers of the domestic animals in the Caucasus were as follows: Horses, 2,065,826; cows and oxen, 6,447,335; buffaloes, 638,160; sheep, 12,604,917; goats, 1,157,554; pigs, 1,268,795. The country has vast possibilities for cattle breeding.

Wool Production, Prices, and Exports.

The following figures give the production and prices of unwashed wool in the central and southern Caucasus for 1913 and 1914:

Origin of wool.	1913		1914	
	Tons.	Cents per pound.	Tons.	Cents per pound.
Georgian spring clip	1,371	a 11-12	1,210	a 11-13
Autumn clip of preceding year	1,935	11-15	1,613	13-16
Colored wool, spring	645	7- 9	484	9-10
Autumn clip	161	11-13	161	11-13
Total	4,112		3,468	

a Prices of this wool, brook washed, were 13 to 17 cents per pound in 1913 and 14 to 19 cents in 1914.

In normal times wool is the principal export from the Caucasus to the United States. In 1914, however, the value of its export to the United States dropped to $708,825 from $848,581 in 1913.

Wool produced in North Caucasus finds its way to and is handled from Rostof-on-Don.

Goat and Sheep Skins.

The average annual production of the Caucasus is estimated at 100,000 goatskins and 600,000 sheepskins. This estimate includes the skins that find their way to the central markets and does not take into consideration the skins consumed in local home industries. To these figures must be added about 200,000 goatskins and 300,000 sheepskins from Persia. The average weight of Caucasus goatskins is 260 to 300 pounds per 100 pieces. The Persian skins are lighter, averaging not more than 253 pounds per 100 pieces. Prices of Russian goatskins ranged in 1914 from 46 to 62 cents per piece, Persian from 36 to 41 cents per piece. The price of Russian sheepskins ranged from 36 to 62 cents per piece, the Persian skins selling at a slightly higher rate on account of the wool; weights ranged from 290 to 400 pounds per 100 pieces. The principal foreign buyers are the United States, Germany, and France, and the principal local market is Tiflis.

Beef and Sheep Casings.

An important and growing business in the Caucasus is the exportation of beef and sheep casings. The former, both dried and salted, are produced in large quantities in all the principal towns of the Caucasus. Part of the production is consumed locally and the remainder was formerly exported to Austria-Hungary and Germany. Toward the close of the year 1914 prices fell and the depression in this line was marked. The contrary can be said in regard to sheep casings, there being an increased demand from the United States. The total annual production of the Caucasus is estimated at over 600,000 pieces, to which must be added 2,000,000 pieces imported from Persia. Tiflis is the principal market for this product. The Caucasian salted casings are rolled round a board in rings about 7 inches in diameter, each ring containing 69 to 75 feet, caliber ⅗ to $1\frac{1}{10}$ inches. About 30 per cent of these rings are composed of one entire piece, 20 per cent are made up of two pieces, and 50 per cent of three or four pieces. The quality varies widely. It is estimated

that 5 to 10 per cent of the total production is ⅜ to $\frac{7}{10}$ of an inch in diameter, 25 to 30 per cent from $\frac{7}{10}$ to ⅘ of an inch, the remainder ⅘ to $1\frac{1}{10}$ inches.

The Persian are superior in quality to the Caucasian sheep casings, but the number of pieces to the regulation ring or parcel of 69 to 75 feet is greater. This is explained by the fact that the Persians slaughter principally full-grown sheep, the casings sometimes being 115 feet long. These long casings are cut to regulation size, the short ends being used to make up the three or four piece rings. It is estimated that about 10 per cent are in one piece, 30 to 40 per cent in three pieces, and the remainder in four or more pieces. The average caliber of the casings is considerably larger than the Caucasian, many reaching 1⅕ inches.

The prices of sheep casings in 1913 ranged from 8 to 9 cents per ring, in 1914 from 11 to 12 cents. Of the total production, Germany in 1914 took 40 per cent, Austria 30 per cent, and the United States 20 per cent. The United States, however, is believed to be the greatest purchaser, as a large proportion of the exports to Germany eventually found their way to the United States.

One firm in Tiflis makes a specialty of handling untrimmed salted sheep casings, one ring containing 79 to 92 feet; the price per ring is slightly higher than that of the regulation size. A considerable stock of dried sheep casings was left over at the close of 1914. These casings are prepared from young lambs and are packed in bundles containing 18 to 22 strings (13.8 inches), every 50 bundles weighing 0.88 to 0.99 pound. Prices in 1914 ranged from $41 to $62 per 1,000 bundles. About 30,000 dried lamb casings are produced annually in the Caucasus, all of which are normally exported to Germany.

Importance of Caucasian Forests.

The area and production of woods and forests in the Caucasus administered by the Forest Department were as follows in 1911, according to the Russian Yearbook:

		Dessiatines.
General area of Crown forests		4,907,271
Areas worked directly by the Government		3,089,863
Distribution:		
Crown forests		1,533,009
Appanage forests		14,693
Forests belonging to private persons		749,413
Forests belonging to peasants		174,969
Forests of various categories of ownership		14,402
Area of forests subject to the protective law:		
Prohibited		73,236
Forests protecting water courses		54,373
		Production.
Total amount of material produced	cubic sazhens[a]	141,766
Gross receipts	rubles	1,126,864
General expenses (not including zemstvo taxes)	do	678,644
Net profit	do	448,220

The forests of the Caucasus, though distinguished by their great richness and variety, are as yet little worked and commerce in lumber is only slightly developed. The kinds of timber found in important quantities in Transcaucasia are those characteristic of warm climates, such as boxwood (*Buxus sempervirens*), walnut (*Juglans regia*), and

[a] 1 cubic sazhen equals 343 cubic feet.

yew (*Taxus baccata*); but these kinds have little commercial importance. The most important trees in commerce are beech (*Fagus sylvatica orientalis*), oak (three species: *Quercus pedunculata*, *Quercus sessiliflora*, and *Quercus castaneaefolia*), hornbeam (*Carpinus betulus* and *Carpinus duinensis*), birch (*Betula alba* and *Betula pubescens*), elm (*Ulmus campestris*, *Ulmus montana*, and *Ulmus effusa*), alder (*Alnus glutinosa*, *Alnus incana*, *Alnus cordifolia*, and *Alnus orientalis*), maple (*Acer campestre*, *Acer lactum*, *Acer platanoides*, and *Acer trautfetteri*), ash (*Fraxinus excelsior* and *Fraxinus oxyphilla*), linden (*Tilia intermedia*, *Tilia platiphylla*, and *Tilia parvifolia*), and poplar (*Populus tremula*, *Populus nigra*, and *Populus euphratica*).

The percentage of the general forest area in the Caucasus of the most important species is as follows: Caucasian beech, 25.8 per cent; oak, 16 per cent; hornbeam, 13.1 per cent; pine, 8.3 per cent; spruce, 6.7 per cent; fir, 6.1 per cent; other species, 24 per cent.

The growth and yield of the chief species are as follows:

	Age.	Height.	Diameter breast-high.	Volume per acre.
	Years.	*Feet.*	*Feet.*	*Cubic feet.*
Caucasian beech	200	140	7	8,000
Oak	120	100	2	5,000
Pine	100	120	4	8,000
Spruce	250	150	5	12,000
Fir	250	170	7	16,000

The most useful of these trees is beech, which grows in great numbers along the sides of the mountains. The beech of the Caucasus is distinguished by the good qualities of its fiber and is suitable for the manufacture of furniture, staves for casks, etc. Oak also grows in considerable quantities and is highly valued.

Among the softwoods are pine (*Pinus sylvestris*, *Pinus montana*, *Pinus laricio*, *Pinus maritima*, *Pinus pinea*, *and Pinus eldarica*), spruce (*Picea orientalis*), silver fir (*Abies nordmanniana*, the dimensions of which are sometimes enormous), and many kinds of juniper trees. The most important of these commercially are silver fir, pine, and spruce.

In many parts of the Caucasus, especially near Borzhom, spruce trees produce excellent material for piano instruments. The wood for such instruments was formerly furnished by Austria, and the supply is nearly exhausted. Piano manufacturers in Petrograd have made experiments with Caucasian spruce trees for this purpose and have achieved excellent results.

Caspian Fisheries.

The Russian waters have always been famous for their abundance of fish. The official statistics published by the Department of Agriculture give the following data concerning the catch of fish in the Caucasus in 1913, exclusive of the waters of Petrovsk and Derbent: Volga-Caspian region, 17,802,000 poods, valued at $26,000,000; Kura-Caspian region, 8,384,000 poods, valued at $9,500,000.

The Caspian Sea maintains a highly developed fishing industry. The richest fishing trade in Russia is concentrated in the southern

part of the Baku district and the River Kura, with a center at the village Salianui. The technical equipment for the preservation of the fish is excellent in the case of some large undertakings.

The Caspian Sea and the lower part of the Volga have always been famous for yielding the highest grade of caviar. In the years 1911 to 1913 the exports of caviar amounted to 175,000 poods, in value $2,000,000. About three-fourths of the amount went to Germany, from which country it was reexported to France, England, the United States, etc.

The number of persons employed in the fishing industry before the war amounted to 127,500 in the Volga-Caspian region and 43,500 in the Kura-Caspian region.

Caucasus Oil Fields.

The oil fields in the Caucasus are Kuban, Grozny, Gurya, and Baku.

Kuban district.—The Kuban district is situated on the northwestern slope of the Caucasian main chain, and comprises several fields whose importance is not yet established. Two of these are Anapa and Taman, where prospecting was begun in 1912, chiefly by British capital, but no final results were arrived at before the war stopped further activities. The Maikop field came to the fore in 1909, when a prolific gusher broke out in it so unexpectedly that the oil was lost, as no preparations for its storage had been made. Enormous excitement followed this event. Companies were formed, and speculation in land and feverish borings began on all sides. A pipe line was laid to the station Einem, and also two pipes to the port of Tuapse. Unfortunately the production of the field was a great disappointment, as only a few wells yielded oil; and in 1916 only 5 of the 66 companies founded in London for the exploitation of this field were still working, mostly in the central and southeastern parts. It is expected that deeper drilling will give better results. The aggregate depth of all the wells drilled in 1912 amounted to 11,929 sazhens (83,503 feet), and in 1913 to 14,475 sazhens (101,325 feet). Prolific oil, high in motor spirits (11–13 per cent) and illuminants (31–38 per cent), was found at a shallow depth.

Grozny.—The Grozny oil fields are situated on the northern slope of the Caucasus Mountains and are connected with the Vladikavkaz Railway by the Baku line and a pipe line with the Caspian Sea at Petrovsk. Deep boring began there in 1903, as hand-dug wells, which formerly had been utilized, were found to be quite inadequate. In fact, the important oil horizons lie very deep in this field; most of the original wells are between 3,000 and 4,000 feet deep, and yet their productivity is diminishing. However, new sections have been taken up during the last few years and are being methodically worked. Special care is being taken to prevent the flooding of the wells by surface water, which accident had happened repeatedly in the beginning of the exploitation. The total area worked in the field in 1916 was 2,861 dessiatines (7,725 acres), and there were 773 wells, of which 385 were in operation.

The total of the drillings executed in 1913 was 203,000 feet: in 1914, 290,000 feet; in 1915, 181,930 feet; and in 1916, 153,307 feet.

A great part of the Grozny oil is exported through the port of Novorossiisk. The quantities shipped from there were as follows: 1910, 170,609 tons; 1911, 234,285; 1912, 213,186; 1913, 219,480; 1914, 149,330. The closing of the Dardanelles stopped further exports, and as the Grozny oil is especially suitable for the production of high-class gasoline, enormous quantities of it are accumulating in the field.

The first refinery for lubricating oils at Grozny was completed during 1914. Grozny occupies second rank as oil producer, and it is estimated that it can easily produce at the rate of 150,000,000 poods (18,000,000 barrels, at 8⅓ poods to the barrel of 42 gallons) for many years. The Grozny works are conducted on a more scientific and economical basis than the works at Baku. In the former all water is perfectly cut off by proper cementing in the wells. The oil is stored in iron tanks, which prevent the heavy loss by evaporation to which the Baku operators are subjected through the extensive use of earth reservoirs. The loss of Baku operators attributed to this cause alone is estimated at 11,000,000 poods (1,320,000 barrels) annually, whereas the cost of iron tanks sufficient to store 100,000,000 poods (12,000,000 barrels) of crude oil would not, it is estimated, exceed $4,000,000, or approximately the loss that is now felt in one and a half years.

Gurya.—This oil field is situated in the district of Ozurgety, at a distance of 25 miles from Batum and only 5 miles from the small ports of Supsa and Nikolas on the Black Sea in Georgia.

Natural outflows of petroleum had been known there for a long time, but only in 1911 a Baku firm made a trial boring which produced a flowing well at a depth of only 63 feet. This immediately caused a great rush to take up lands in the neighborhood; experts were sent to the spot and several British and other companies formed. Drilling was started in 1913 in three places, but the outbreak of the war interrupted the work.

The investigations will, no doubt, be taken up again as soon as circumstances permit, since the favorable position of this field practically on the Black Sea coast makes it specially interesting.

Baku.—The name "Baku," or rather "old Baku," oil fields is applied to the four oil fields of Balakhany, Sabuntchi, Romany, and Bibi-Eibat, covering an area of a little over 1,000 dessiatines (2,700 acres).

The work of the Russian Geological Committee has shown that, in reality, the old fields mentioned are not limited to that area and might be considerably enlarged; but owing to the difficulties arising from the system of leasing the unexploited parts of the old Baku oil fields belonging to the State (also estimated at about 1,000 dessiatines), Baku petroleum enterprises have been restricted to the existing oil fields.

A gradual exhaustion of the upper petroleum levels obliges the works to keep up their output by constantly boring deeper and deeper, thus naturally increasing the cost of production. Of late it has not been uncommon to find borings in Baku 300 or 400 sazhens (2,100 or 2,800 feet) deep, although even now the average productivity of the wells can not be considered great. In 1912 the average depth was only 184.7 sazhens (1,293 feet), as against 145.8 sazhens (1,021 feet) in 1901. It is the opinion of competent geologists that the Baku oil fields still contain large quantities of petroleum at a very considerable depth, so that the generally accepted view of the exhaustion of the

old Baku oil fields may be taken to be correct only in the upper levels of the fields. If in spite of deeper borings and the larger number of wells, the output of the old oil fields should fall, there would be no denying that the old Baku oil fields are becoming exhausted. How much petroleum and at what cost can be obtained at the greater depth must remain an open question.[a]

Besides the four old fields there are also in the Apsheron Peninsula the Surakhany and Binagadi fields; the latter includes the hand-dug wells of Kharasan and Shubani. The area of oil land under exploitation in the Baku region at present is about 5 square miles. The number of productive wells is 3,500, distributed among about 200 oil-producing firms. The Sviatoi, or Holy, Island field lies 3 miles off the peninsula.

Baku oil is heavier than that of Pennsylvania; its density is 863 to 872. It is very prolific in heavy oils yielding lubricants. On distillation it furnishes 5 per cent of light oil, 25 to 35 per cent of kerosene, and 55 to 65 per cent of residue, heavy oils, or "mazut." The residue is used principally for the preparation of lubricants. Upon distillation in steam the residue yields 15 per cent of turbine oil and 35 per cent of machine oil. The remaining waste, or "mazut," is used for burning on locomotives or elsewhere, although it may, by superheating, be partly transformed into lighter oils.

Oil Production in the Caucasus Fields.

The following table, compiled from figures published by the United States Geological Survey, gives the production of oil in the various Caucasus fields from 1907 to 1917, in barrels of 42 gallons:

Years.	Baku.	Grozny.	Maikop.	Other.	Total.
	Barrels.	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*
1907	57,143,097	4,707,637	.....	.....	61,850,734
1908	55,936,880	6,249,767	.....	.....	62,186,447
1909	59,123,650	6,846,700	.....	.....	65,970,350
1910	61,039,149	8,889,359	176,640	178,126	70,263,274
1911	54,526,633	9,026,361	972,453	1,604,944	66,110,391
1912	56,806,723	7,851,140	1,104,442	1,992,803	67,755,108
1913	48,763,985	8,842,649	576,582	3,820,156	61,803,372
1914	49,489,418	11,818,150	475,019	3,021,368	64,803,955
1915	51,757,419	10,582,320	910,204	3,083,953	66,333,896
1916 [a]	55,810,764	12,332,683	240,096	2,352,941	70,736,284
1917 [b]	49,560,000	14,760,000	(c)	[d] 2,280,000	[d] 67,200,000

[a] Estimated in part. [b] Estimated. [c] Included in "Other."
[d] Includes production of Ferghana, in Turkestan, which is not given separately for 1917. In the three years preceding, it varied from 215,000 to 240,000 barrels.

Oil Production of Principal Countries.

The following table, giving the production of oil from 1914 to 1917 of the principal producing countries of the world, shows the relative importance of the Russian oil fields. It will be noticed that the Caucasus output constitutes almost the total yield for Russia.

Countries.	1914	1915	1916	1917
	Barrels.	*Barrels.*	*Barrels.*	*Barrels.*
United States	265,762,535	281,104,104	300,767,158	335,315,601
Russia	67,020,522	68,548,062	72,801,110	69,000,000
Mexico	26,235,403	32,910,508	40,545,712	55,292,770
Dutch East Indies	11,834,802	12,386,800	13,174,399	12,928,955
Rumania	12,826,579	12,029,913	10,298,208	2,681,870
Galicia	5,033,350	4,158,899	6,461,706	5,965,447

[a] The foregoing paragraphs on Baku were adapted from Russia: Its Trade and Commerce, edited by Arthur Raffalovich.

Baku Oil Refining.

The refining of oil takes place at Black Town and White Town, industrial sections to the east of Baku. The refineries number 30. Nearly all the petroleum produced in the Caucasus is refined in the Baku region. The refineries existing in Nizhni Novgorod, Moscow, Petrograd, and Riga distil only about 10,000,000 or 12,000,000 poods per annum.

In calculating the cost of the refining operations there must be taken into consideration as a basis the cost of the crude oil delivered at the refinery; the fuel, for which often the residues of the distillation are used; the cost of chemicals, administration and labor, and general expenses.

As an indication of the various products of the Baku refineries, the following list gives the output for April, 1916. The total production amounted to 23,848,900 poods, made up as follows:

	Poods.
Illuminating oils (kerosene, pyronaphtha, and astral oil)	5,874,900
Lubricating oils (spindle, machine, cylinder, etc.)	980,500
Solar oils, light and heavy	514,000
Gasoline	101,300
Residues	13,585,000
Paraffin	6,800
Other products	2,786,400

Oil is pumped from the places of production to the Black Town district or is brought in small barges from the Bibi-Eibat field. There are also works engaged in the production of machinery and tools required in oil extraction, chemical works for the production of sulphuric acid, caustic soda, and saponaceous bases, and brick, stone, cement, flour, timber, printing, and cotton works.

Transportation of Oil and Oil Products.

Oil is transmitted from Baku on the Caspian to Batum on the Black Sea by means of a pipe line 560 miles long, which has 19 pumping stations. The diameter of the pipe is 8 inches and it has a capacity of 60,000,000 poods per year. Its cost was 25,000,000 rubles ($13,000,000).

The quantities of oil thus transported were as follows: 1900, 21,490,000 poods (2,578,800 barrels); 1901, 59,162,000 poods (7,099,440 barrels); 1902, 56,495,000 poods (6,779,400 barrels); 1903, 52,780,000 poods (6,333,600 barrels); 1904, 64,695,000 poods (7,763,400 barrels); 1905, 19,543,000 poods (2,345,000 barrels); 1906, 21,760,000 poods (2,611,200 barrels); 1907, 26,570,000 poods (3,188,400 barrels); 1908, 27,674,000 poods (3,320,880 barrels); 1909, 19,788,000 poods (2,374,560 barrels); 1910, 26,425,000 poods (3,171,000 barrels); 1911, 23,630,000 poods (2,835,600 barrels); 1912, 22,000,000 poods (2,640,000 barrels).

While this pipe line is now more than sufficient for the transportation of the Baku products to the Black Sea, the trade has at its disposal on the Caspian Sea a considerable number of steamers and sailing vessels adapted for it, as the following table shows:

Years.	Number of steamers.	Capacity.	Number of sailers.	Capacity.
		Cubic feet.		*Cubic feet.*
1906	131	5,294,774	140	2,886,841
1907	129	5,230,246	144	2,792,719
1908	129	5,225,100	142	2,764,849
1909	127	5,200,245	145	2,846,982
1910	120	5,239,409	150	2,993,653
1911	121	5,011,191	147	2,899,687
1912	118	5,518,664	60	1,755,034

In 1912 the transport of petroleum products formed 37 per cent of the whole traffic on the Volga and 5 per cent of the total traffic on all the Russian railways. The means of transport used for the Baku products are shown by the quantities forwarded during April, 1916:

	Poods.
By Transcaucasian Railway	2,553,200
By Transcaucasian Railway to Batum	1,019,500
By Vladikavkaz Railway	531,700
By sea to Astrakhan	43,818,500
By sea to Petrovsk	304,900
By sea to Transcaucasia	773,700
By sea to Persia	247,600
By sea to other ports	421,000
Total	49,670,100

Of the other producing centers Grozny sends a part of its crude oil to the refineries in Novorossiisk, whence the light oils are exported, while the residues, which amount to about 16,000,000 poods (178,000 barrels, at 9 poods to the barrel) per year, are pumped to Petrovsk on the Caspian Sea by pipe line and there shipped by steamer to Astrakhan and Central Russia. The Maikop production goes for refining mostly to Ekaterinodar and is consumed locally.

Importance of Home Market—Increased Russian Consumption of Fuel Oil.

The home market is of the highest importance to the Baku industry, and even more so to the whole country, as heating and lighting materials are generally scarce. Coal especially, which is indispensable in many industries, labors under great and constant difficulties of transport. As the export trade has considerably diminished, especially since 1905, in consequence of American competition, the home market has easily absorbed by far the greatest part of the production, and the consumption can only increase in the future as new manufactures are created in the country.

Only 6,500,000 poods per year of illuminating oil can be transported directly by water to the centers of consumption, while 40,000,000 poods can be carried by sea to the Volga ports, there to be reloaded on the railways, and the rest must be carried by railway only, direct from the factories to the consumers.

In the last few years large quantities of fuel oil have been shipped to the Volga ports for distribution in the interior of Russia as follows: 1913, 77,035,100 poods (8,559,500 barrels, at 9 poods to the barrel); 1914, 75,024,200 poods (8,336,000 barrels): 1915, 102,799,400 poods (11,422,200 barrels). The great increase of 1915 is due to the

disturbance of the coal production by the war and the urgent necessity of obtaining fuel from other sources. The consumption of the immediate neighborhood of the producing centers is in itself not inconsiderable. Baku, for instance, uses 10 to 15 per cent of its production of crude oil as fuel, although this quantity is gradually decreasing, as electrical energy and fuel-saving engines are being introduced. The Transcaucasian Railway in 1912 used 15,000,000 poods (1,667,000 barrels) and the Vladikavkaz Railway 17,000,000 poods (1,889,000 barrels).

Development of Export Trade in Oil.

It may seem strange that the products of the Baku petroleum industry from the very beginning should have been utilized almost exclusively for the export trade and not for home consumption. One of the chief reasons for this anomaly was the fact that Baku was far distant from the chief distributing centers of the Empire and had practically no railway connection with them. Moreover, the Government was fostering the export trade from its initial stages. It released the export goods from the excise duty and even encouraged the exporters by a special export premium of 4 per cent. Exportation was chiefly concentrated in the Black Sea port of Batum, whence the goods were shipped to the countries of western Europe, Africa, and the Far East. The exportation through the Caspian Sea to Persia was of comparatively small importance.

The Transcaucasian Railway and the pipe-line to Batum were really the makers of this export trade and at the same time gave to the port of Batum a considerable increase in activity and importance. About 100 huge tanks were erected there for storing the oil brought from Baku by rail and by the pipe-line. Then about 10 special factories were started for the manufacture of tin cans and wooden cases, which, in the beginning, were the usual mode of packing the oil for export, each case containing usually 2 cans of 4 gallons each of petroleum. This packing required a great number of men and important installations of modern machinery. Rothschild's factory, which was installed in 1892, was the most important and could produce and fill 36,000 tins per day and pack them into the respective wooden cases. This factory occupied about 1,400 hands and had 28 iron tanks of its own. The number of such cases exported from Batum was 2,276,512 in 1910 and 1,400,000 in 1912. Two-thirds of the entire exports of the port of Batum consisted of petroleum products, and the port had no competition to fear from the other Black Sea ports, as, for instance, to the port of Novorossiisk the railway tariff on petroleum products was 7¼ kopecks per pood higher than on the Transcaucasian Railway.

Labor Conditions in Oil Industry.[a]

In 1913 the number of workmen and officials directly engaged in the petroleum industry in the Caucasus was about 60,000, of whom about 46,000 were connected with the Baku fields—42,105 in production and 3,925 in the refineries, pipe-lines, and docks. In the Grozny district there were about 7,200 men engaged in production and 372

[a] The remaining paragraphs on the oil industry were taken from The Caucasian Petroleum Industry, by D. Ghambashidze.

in the refineries—a total of 7,572. Maikop occupied 1,270 men in production and 74 in the refineries—a total of 1,344. The refineries in Novorossiisk employed about 134 men and the pumping station in Batum 363.

According to nationalities the workmen were divided as follows: Tatars and Persians, 54.3 per cent; Russians, 23.1 per cent; Armenians, 19.4 per cent; Georgians, 3.2 per cent.

According to occupations the relative numbers work out in the following proportion: Administration, 6.6 per cent; foremen, 14.3 per cent; mechanics, 4.2 per cent; skilled workmen, 36.9 per cent; unskilled laborers, 27.8 per cent; apprentices, 1 per cent; other workers, 9.2 per cent.

In Baku itself the numbers of men employed in the oil industry amounted to 46,439 on September 1, 1915, and to 48,526 on September 1, 1916. The latter were distributed in the different branches as follows: Petroleum production, 31,199; boring, 8,812; mechanical workshops, 3,714; refining, 4,801; total, 48,526.

In 1909 the 8-hour working day was introduced for the men at the wells and 9 hours for those in the shops. Housing is provided for 71 per cent of all the officials and workmen by their employers; 22 per cent of them are paid lodging money, while the remaining 7 per cent are not specially provided for.

The petroleum workers of Baku, Grozny, and Maikop are organized in several associations for protecting the interests of their industry. The most important of them is the Baku Association, founded in 1889. Originally its functions were very modest, but it has grown into a very important organization. In 1914 its budget amounted to 2,704,875 rubles. The following were the items of its expenditure:

	Rubles.
For medical aid	860,000
For education	248,000
For road construction	131,000
For collection of statistics and publications	70,000
For collection and sale of oil otherwise lost on the roads	57,000
For drainage and lighting	52,000
For maintenance of the police force	587,000

Foreign Capital in Oil Industry.

In the development of the Russian oil industry foreign capital plays a prominent part. The first important foreign enterprise, that of Nobel Bros., was founded in 1872 with a capital of 3,000,000 rubles, which was increased in 1881 by 3,000,000 rubles, in 1882 by a further 4,000,000, and in 1883 again by 5,000,000, thus making a capital of 15,000,000 rubles, and showing the sudden expansion of this business concern. On the other hand, the oldest Russian enterprise, the Bakinskoie Nephtyannoie Obshtchestvo, founded in 1874, with a capital of 7,500,000 rubles, had to write it down to 2,000,000 rubles in 1894, and only the help of French money brought it up again to about 8,000,000 rubles. Russian capitalists kept strangely aloof from this industry, even after the railway to Batum had been built and had opened up the prospect of a great export business. Its possibilities were soon recognized by the Rothschilds of Paris, who founded in 1883 the Caspian Black Sea Co., and in 1898 the Masut Co., which was later bought up by the Shell Co.

The following table, from the Nephtyannoie Dyelo, shows the original capital and the capital in 1915 of the older companies:

Companies.	Year of foundation.	Original capital.	Capital in 1915.	Companies.	Year of foundation.	Original capital.	Capital in 1915.
Foreign capital:				Foreign capital—Continued.			
Baku Russian Petroleum Co.	1874	*Rubles.* 2,000,000	*Rubles.* 7,700,000	Russian Petroleum Co.....	1884	*Rubles.* 2,000,000	*Rubles.* 24,750,000
Nobel Bros.....	1879	3,000,000	30,000,000	Russian capital:			
Ragozin.....	1880	3,500,000	1,800,000	Mirzoeff.....	1886	2,140,000	3,210,000
Caspian-Black Sea Co.....	1883	1,500,000	10,000,000	Caspian Co.....	1887	1,500,000	10,000,000
Schibaeff	1884	1,500,000	6,500,000				

Therefore, while the foreign enterprises increased their capital by 67,250,000 rubles, the Russian companies added only 9,570,000 rubles to theirs.

British capital became specially interested in the Russian oil industry after 1898, and between that year and 1903, 85,720,000 rubles were invested in it from this source, the most important enterprises being the Schibaeff Petroleum Co., the Russian Petroleum Co., and the Baku Russian Petroleum Co. The new fields, like Grozny, are controlled almost entirely by British and French capital.

It may be confidently hoped that foreign capital will always be welcome in the Russian oil industry. At the same time it must be mentioned that during the war there has been a great accumulation of capital in the Caucasus, some of which will find its way into this industry. But extensive new installations and technical improvements will have to be provided from abroad, and this will offer great and fruitful opportunities to American finance and enterprise. The expected general development of industry in the whole of Asia will cause an ever-increasing demand for oil, and this will give new impetus to its production and to the opening-up and exploitation of new fields.

Importance of Manganese Deposits.

Mining at present is little developed, but it could be made a most important branch of the economic activity of the Caucasus. The mineral resources of the region are vast. Of particular importance is the manganese ore of Georgia, where the output equals 70 per cent of the total amount of manganese ore produced in Russia.

The manganese deposits of the Caucasus are among the richest in the world. The principal mines are situated at Tchiaturi, in the Kutais Government, about 125 miles from the Black Sea ports of Batum and Poti. The exploitation of these mines began in 1878 but remained on a very limited scale until 1885, when the Transcaucasian Railway was constructed. The mines at Tchiaturi lie in a region of horizontal sedimentary formations, divided by the Kvirili River. These are again crossed by numerous branches of the river, so that the entire region is divided into seven plateaus: On the right side of the Kvirili—Rgani, Sedergani, Mguemevi, and Darkveti; on the left side—Perevissi, Tchueruti, Itkhrvisi. The total area covered by these mines is about 55 square miles, of which 44 square miles contain good ore.

The ore outcrops are about 1,000 feet above the level of the river and lie in a horizontal bed, with limestone below and sandstone above. Besides solid benches, the ore also occurs in granules (oolitic form) mixed with sandstone. The richest ore has been found in the plateaus of Mguemevi, Sedergani, and Tchucruti; Rgani plateau yields rich wash ore. According to the calculations of Russian geologists, the Tchiaturi mines contain about 1,070,000,000 tons of ore, estimated to be sufficient to supply Europe and the United States for at least half a century, especially as the Tchiaturi ore is of high quality. The mines can be worked easily over great areas, by galleries, with the use of picks and shovels.

Ownership and Working of Mines—Transportation of Ore.

The mines are owned by a large number of Georgian peasants, who are without capital or knowledge of mining. Until recently, with few exceptions, the mines have been worked in a most primitive way, resulting in the recovery of only about two-thirds of the ore. Within the last seven years various foreign firms have bought up some of the larger plots and have started mining by more modern methods. The lump ore is separated by hand from the sandstone; only the ore occurring in granules is separated by water concentration in washing plants. In washing, the granular ore can be concentrated up to 60 per cent of metal or 90 per cent of manganese peroxide (MnO_2), but these percentages are above the averages for the district.

The ore is transported to the railroad at Tchiaturi in two-wheeled oxcarts or by pack horses over poor roads for distances varying from $1\frac{1}{2}$ to $3\frac{1}{2}$ miles, at a cost of 1 to 1.5 cents per pood (36.1128 pounds). The position of the mines is favorable for mechanical transportation of ore, especially by wire ropeways, but on account of lack of capital such methods have begun to be employed only recently and by a few firms. From Tchiaturi the ore is carried on the Tchiaturi Railway, a 25-mile narrow-gauge branch of the main line, to Sharopan, where it is transferred into the cars of the Transcaucasian Railway and shipped to either Batum or Poti.

Explored But Unexploited Manganese Deposits.

There are also deposits in the Tchorokh Valley (Georgia). Manganese ore occurs in another interesting deposit near Kartla, on the left bank of the Tchorokh River and not far from it and the highroad, about 35 miles from Batum. The ore is pyrolusite, of good texture, and not very friable. It exists in three layers having a total thickness of about 3 yards. The beds are horizontal and their natural outcrops make extraction easy, no expensive or complicated operations being required. Assays of samples gave 53.60 and 54.40 per cent of manganese metal, 0.07 to 0.09 per cent of phosphorus, and 6.10 to 8.52 per cent of silica, without other objectionable elements, so that the ore seems of superior quality. An Anglo-French syndicate took an interest in this deposit some years ago, but only exploration work has so far been done in it, and the exploitation of this and other mineral occurrences in the Tchorokh Valley depends probably on the building of the projected railway through it.

Manganese ore also crops out in the valley of the Itchkhala River (Georgia), a tributary of the Tchorokh from the western side, about

20 miles from Batum. The ore is also pyrolusite, in places mixed with iron ore and containing up to 27 per cent of iron. Only superficial exploration work has been done.

Other highly interesting deposits occur also in Lazistan, formerly part of Turkey, southwest of Batum. This district forms the continuation of the mineralized zone of the Tchorokh Valley across the Hemshin mountain range, and the most of the valleys running from the latter northward to the sea between Rizeh and Surmeneh contain some minerals, as manganese, iron, copper, or zinc.

In the Kara-dereh Valley, near Surmeneh, large occurrences of manganese ore have been traced over a distance of about 6 miles along the mountainside. The outcrops, where exposed, have a width of 4 to 10 feet and consist of high-grade pyrolusite. The nearest point of the deposit is only about 2 miles from the sea.

Similar formations exist in the Treeboli Valley. The outcrop stands out prominently and has a thickness of about 12 feet; the lode strikes east and west, with a dip to the northwest and is composed of limestone showing nodules and heavy impregnations of manganese ore. The center of the lode carries a vein of good ore, samples of which contained 49.66 per cent of manganese metal. This outcrop is about 6 miles from the sea and easily accessible.

Other deposits of the same nature occur at Gooshak, where the quantity of available ore is estimated at 1,000,000 tons; at Dharluk, 2 miles from the coast, where at least five beds of rich ore are exposed; at Sharadek, Khraklabek-tcha, Badaheltree, and Govanyak, all lying in the same district and within a few miles from the sea, where loading stages can be built easily. Water is available, in every valley for washing and concentrating the ore, if necessary, and transportation to the loading places would require only short tram lines. The cost of the ore delivered on board ship would therefore be very low.

Number of Mines—Production of Ore.

The number of mines with drifts under exploitation for the years 1913 to 1917 was as follows: 1913, 303 mines and 437 drifts; 1914, 192 mines and 226 drifts; 1915, 95 mines and 153 drifts; 1916, 106 mines and 144 drifts; 1917, 84 mines and 96 drifts.

The total production of manganese ore in the Caucasus for the years 1911 to 1916 was as follows: 1911, 451,600 tons; 1912, 725,806 tons; 1913, 902,000 tons[a]; 1914, 566,000 tons[a]; 1915, 254,000 tons; 1916, 237,000 tons. The declaration of war seriously affected the production of manganese. This was due to the shutting down of a considerable number of mines and to the limited exploitation undertaken. Figures for the year 1917 are not available, and during the year 1918 practically no mining was done.

Operations of Concentrating Plants in Tchiaturi.

In the Tchiaturi region up to 1914 there were 27 concentrating plants. In the following table, taken from a publication of the Council of Manganese Producers, is shown the number of plants in opera-

[a] No accurate figures are available; these are estimates based on figures given in Mineral Industry for 1917 and on the assumption that the Caucasian production is 70 per cent of the total for Russia.

tion for the years 1914, 1915, 1916, and 1917, together with other particulars:

Years.	Plants.	Ore received at plants.	Amount of washed ore.	Loss in washing.	Laborers.	
					For washing.	For handling.
	Number.	*Poods.*	*Poods.*	*Per cent.*	*Number.*	*Number.*
1914	18	23,241,000	15,067,000	35.17	178	200
1915	18	12,530,000	7,817,000	37.61	170	15
1916	22	17,228,500	9,568,800	44.51	417	38
1917	21	11,967,000	6,668,000	44.27	222	39

In 1914 only 18 out of 27 plants were running, making the production smaller than that of 1913 by 7,000,000 poods; however, taking into consideration that the plants were operated practically only during the first six months of 1914, it will be remarked that in that year the production of every plant increased, and if war had not occurred an output nearly twice as large as the one indicated would have been obtained by the end of the year. The next year, 1915, the same number of active plants produced only 7,817,000 poods of washed ore. In other words, the production decreased by 7,250,000 poods, or 48 per cent. In 1916 the number of active plants and the amount of ore produced in connection with the demands of the Russian metallurgical factories making war materials increased, but in 1917 there was a still more noticeable fall in the amount of washed ore. In comparison with the production for 1914, this 1917 output showed a decrease of 8,399,000 poods, or 55.7 per cent.

Manganese Exports from Black Sea Ports.

The exports of manganese ore from the Caucasian ports of Poti and Batum during the seven years before the war were as follows:

Ports.	1908	1909	1910	1911	1912	1913	1914
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Poti	365,600	544,000	364,500	442,460	634,200	649,780	415,016
Batum	8,160	25,500	36,215	129,233	308,372	429,900	312,129
Total	374,760	569,500	400,715	571,693	942,572	1,079,680	727,145

For the 10 pre-war years Germany took 41 to 47 per cent of the total quantity of manganese ore exported from the Caucasus.

In 1912 the manganese-ore traffic became a prominent feature of the trade of the port of Batum, but it was seriously handicapped by the lack of proper facilities. A portion of the quay in the inner harbor has been set apart to meet its requirements, but there are not enough berths for the increasing number of large vessels that the trade brings. The situation is made still worse by the condition of the port, which causes great delays and inconveniences and is dangerous to shipping in bad weather.

Manganese Shipped to Russia—Large Stocks—Firms Handling Manganese.

Shipments of manganese ore to Russia from the Caucasus amounted to 21,700 long tons in 1915, 175,000 long tons in 1916, and 46,500 long tons in 1917. This was a considerable increase in the amount of man-

ganese consumed by Russian industries over the pre-war period; previous to 1915 this consumption had never exceeded 32,000 long tons in any one year.

Notwithstanding the decrease in production during the war, the lack of opportunity to dispose of the ore left the manganese producers of this region with enormous stocks on hand at the end of 1917. In June, 1919, at the port of Poti and at Tchiaturi, there were approximately 935,000 long tons of cleaned ore, above ground, ready for shipment. This ore varies in quality from 50 to 60 per cent, ordinary, up to 88 to 90 per cent pure dioxide.

Most of the Georgian producers have combined to form the Manganese Producers' Stock Co. (Actionnerny Obshtchestvo Margantseipromyshlennikov), a semigovernmental institution that is designed to control the industry, in spite of the fact that it owns only 242,000 long tons out of the 935,000 long tons above ground. Three-fourths of the remainder is controlled by the two great exporting firms of Tchilingiurian Bros. and M. Manuelides, of Batum. These two firms are not actual producers, but are buyers and exporters.

The most important companies prior to the war were the Caucasian Mining Co., Gelsenkirchener Bergwerks Verein, and one English company. The Caucasian Mining Co. was estimated to have 225 dissiatines (about 600 acres) of property, containing 10,000,000 tons of ore, and produced about 150,000 tons of washed ore per annum. Its washing plant was very well built, with machinery furnished by the well-known Humboldt company in Cologne. This company was to be liquidated. The Gelsenkirchen company probably had 20,000,000 tons of ore, but delayed the working of its own property with the idea of keeping it for the future, and bought ore from small contractors.

Manganese Output of Principal Countries.

The following figures give the output of manganese ore in the principal producing countries for 1914 in metric tons (1 metric ton= 61 poods, or 0.984 long ton):

	Metric tons.
Hungary	11,413
Bosnia and Herzegovina	4,120
Brazil	[a]183,630
Canada	25
Greece	558
India	693,824
Italy	1,649
Japan	17,076
Queensland	6
Russia	737,300
Sweden	3,643
United Kingdom	3,496
United States	2,677

The 1913 production in France was 7,732 tons and in Germany 330,797 tons.

Importance of Copper Deposits.

The most recent and the fullest account of the copper resources of the Caucasus is contained in Mr. D. Ghambashidze's book entitled "Mineral Resources of Georgia and Caucasia," from which the following

[a] Exports only.

information is taken. It should be noted that the word "Georgia," as used here, includes certain portions of the former Turkish Empire that are adjacent to Transcaucasia on the southwest.

After petroleum and manganese, copper is the most important mineral product of the Caucasus. The copper ores are generally found in fissure veins and consist principally of chalcopyrite, mixed sometimes with malachite and other modifications, besides different noncupreous ores. Of the latter the most common are iron pyrites, which in many places predominate, while composite zinc ores containing blende and galena form the bulk of other veins, the copper forming only an accessory part.

Copper ores occur almost everywhere in Georgia. If the exploitations are comparatively few, the reason lies principally in the absence of easy means of access to the mines (mostly situated in the mountains) and the difficulty of transporting to them the necessary fuel, which may have to be imported by sea. These difficulties make it imperative for new concerns to provide for large preliminary outlays for roads and means of transport, so that small companies have less chance of increasing their production of metal, however plentiful their ore reserves may be. The fuel problem might be avoided by exporting the ore to foreign smelters; but this policy has not been encouraged, because Russia itself was a great consumer of copper and did not produce enough for its needs.

Three Zones of Copper Deposits—Kedabek Mine.

The copper deposits of Georgia are situated (1) south of Tiflis, east and west of the Tiflis–Kars Railway; (2) in the Tchorokh district, in the southwestern corner of Georgia; (3) in the Zangesur district, in the southeastern part.

The best-known mine of the first zone is Kedabek, which for many years ranked first in the country. It is situated southeast of Tiflis, about 25 miles from the station Dalliar of the Tiflis–Kars Railway, and belongs to Siemens Bros.

The ore deposit lies at Mis-Dag (Copper Hill), near the works, and consists of a succession of lenticular ore bodies of considerable dimensions, being up to 160 feet thick and 820 feet long in one instance, while the intervening spaces sometimes narrow down to a thickness of 6 feet. These lenses, of which 17 were discovered and worked out, were filled with quartzose rock and porphyry, containing chalcopyrite and oxidized black copper, mixed with iron pyrites, also zinc blende and galena, partly with barytic gangue.

The country rock consists of quartziferous andesites, which are almost completely covered by a flow of lava.

Alaverdi and Other Mines of French Company.

The second copper producer of this zone is situated at Alaverdi, near the station Akhtala of the Tiflis–Kars Railway. The mines were worked 160 years ago by the Georgian kingdom and have been exploited since 1897 by a French company (Société Industrielle et Métallurgique du Caucase) on a lease expiring in 1944. As at Mis-Dag, the vein here forms a succession of lenses, which vary considerably in thickness and frequently branch out sidewise. Their average thickness is about 42 feet, but the largest one encountered so far was 36 feet thick, 120 feet wide, and 600 feet long. The ore is chalcopyrite and some purple ore, mixed with iron pyrites, and its copper content varies between 36 and about 10 per cent.; it also contains about a dollar's worth of gold and silver per ton. The capacity of the smelter is 160 tons of 5 per cent ore per day. In 1908 the mine produced 1,871 tons, and in 1913, 3,735 tons of copper, the average cost being about 11 cents per pound.

Besides Alaverdi, the French company exploits several other mines, two of which are situated in the same district. Tchamluk, which it holds on lease, lies about 9 miles northeast of its smelter and is of analogous geological formation to the Alaverdi deposit, consisting of a series of pockets or widenings of the vein in gypsum and barytes. The ore produced here is treated at Alaverdi.

A similar mode of exploitation is carried on at Shagali, situated east of Alaverdi in the upper valley of the Bortchalo River. A quartz vein containing chalcopyrite is being worked here, and the ore extracted is also carried to Alaverdi for treatment, although a small smelter existed on the spot in connection with this mine.

Smaller Veins in Same Neighborhood—Other Deposits.

The establishments of Kedabek and Alaverdi possess the only large smelters in this district, but there are several veins in the neighborhood either being explored only or worked in a small way, their production going to the said smelters. One of them occurs in the Kasakh district and is worthy of notice, as the work done in it seems to promise well. It was known to the ancient miners, as there are many indications of old workings on the property and large slag heaps, proof that at that time the ore was smelted on the spot.

Before the war small quantities of ore were extracted, but the principal work consisted of preparing the mine for more intensive extraction. Six galleries and two shafts of an aggregate length of about 500 feet and a depth of 60 feet, respectively, were opened up. The ore found during these operations was mostly chalcopyrite and also copper glance (covelline), or a mixture of both. Copper glance occurs in a vein about 14 inches wide and assaying 30 per cent of copper, which has been followed over a length of 50 feet. About a dozen other veins were met during the investigations, consisting mostly of chalcopyrite. There are also outcrops in the higher part of the property; one of them, about 2 feet wide and carrying copper glance and chalcopyrite, can be traced over a distance of about 150 feet, but none of these outcrops has been fully examined. The situation of this deposit is advantageous, and only sufficient capital seems required to make it an important producer.

The western part of this copper belt is not less rich in metalliferous ores, but being more remote and mountainous, it has apparently attracted less attention.

Two contiguous old mining fields have here to be mentioned, situated at Djaraior and Tchan-Bakhtcha, southwest of Tiflis, about 40 miles from the railway. The ore is largely copper glance, cuprite, and malachite, while chalcopyrite, which predominates in most of the other copper zones, is comparatively rare.

All the other veins are of similar nature; the average thickness of those which have been worked or well explored is 32, 18, 28, 4, 8, 23, and 15 inches, respectively. The ore available above the water level is estimated at 1,750,000 tons, the average contents in copper varying from 18 to 22 per cent, and this richness will probably bring this mining field to life again sooner or later.

To the southeast of Djaraior, in the direction of Erivan, several other deposits of copper ores are known, but are not exploited. The following occurrences may be mentioned: At Delijan there are considerable outcrops of a vein widening out into lenses or pockets in altered porphyry. Their ore is said to contain 6 to 7 per cent of copper. At Karavan-Saral in the same region a very promising vein about 24 inches thick is known in porphyritic rock. Farther south, near Novo Bayazet, on the western shore of Goktcha Lake, copper veins occur in many places but are not explored. Near Alexandropol the Sisimadan mines are worked in a small way and have a smelter attached to them, which is, however, not of great importance. The vein is said to be about 4 feet thick, lying at the contact of diabase with limestone and gypsum, and to contain 12 to 15 per cent of copper. Other mines are being explored at Shakar-Dara and Tamir-Magara, and small quantities of ore are extracted from them.

Other interesting occurrences of copper ores exist east of the Tiflis-Kars Railway in the Kazakh district at Vartikegh and Avessi-Tchal. They lie opposite each other on two hills, separated by the River Indja-Su, an affluent of the Kura, but are of identical formation with parallel veins. The country rock is diorite, much decomposed, specially at the former place. There are four outcrops of copper ores at Vartikegh and three at Avessi-Tchal, in the shape of important veins, two of which are over 3 feet wide. They consist of quartz with chalcopyrite, also decomposed in places and containing there copper glance and green malachite. Only superficial exploration work has been done in this field, by small galleries and open trenches along the veins, but its result leaves no doubt that it is an important deposit, which deserves fuller investigation.

The environs represent a zone of remarkable mineralization. Immediately north of the copper there are outcrops of magnetic iron ore with a great number of old workings, and west of them are important deposits of hematite, consisting of more than 40 veins, some of which are over 3 feet thick at the outcrops. In the northeast manganese ores crop out, and other deposits of copper are being worked east and south of this field.

Farther east, about 30 miles from Kedabek and 20 miles from the railway, another important deposit of copper and sulphur ores occurs at Djiraki-dsor, near the village Tchaikent. The ore bodies crop out in quartzite, partly covered by clay schists, at the bottom of a ravine. They were worked in the first instance for iron pyrites, as an outcrop of this mineral, about 190 feet long, was lying open along the side of the hill. It forms an enormous and compact stock whose depth into the hillside has not yet been ascertained, but it must be considerable. At present it is being worked in open case and also by galleries, and is sent to Baku to the sulphuric-acid factories, where it replaces the brimstone formerly imported from Sicily. It is of remarkable purity, showing a sulphur content of 50.51 to 51.73 per cent in cargoes, without objectionable elements.

In the course of this exploration chalcopyrite was found and roughly sorted out from the iron pyrites; from time to time a few wagonloads of it were sent to the Alaverdi smelter, the bulk containing 20 to 25 per cent of copper. In places the iron pyrites also contain metallic copper in the shape of small specks disseminated through them. Lentils of pure copper glance have been met, weighing as much as 5 to 6 tons and containing 61.45 to 65 per cent of copper. This metal therefore became interesting, and a cross gallery was driven from the pyrites works, which at 40 feet cut an important vein of chalcopyrite, of a thickness between 3 and 7 feet and containing 12 to 20 per cent of copper. An outcrop at the contact of granite about 400 yards from the mine was also examined and found to contain chalcopyrite and copper glance and to continue in depth. These minerals also contain gold, analyses having proved up to 3.9 pennyweight per ton. Further explorations were projected in these mines, but were stopped by the war.

Tchorokh Valley District.

The Tchorokh Valley, containing the second group of copper mines to be considered, begins a few miles south of Batum and extends southward for about 60 miles to Lazistan (a district in the former Turkish Empire). The Tchorokh River receives many tributaries from both sides and is of fair size, sufficient for navigation at all seasons if it could be tamed; but its fall is considerable, making its flow rapid and dangerous in places, on account of sudden windings and other obstacles. Transport at present is by means of long, flat-bottomed boats, which go only downstream and have to be dragged up empty by the boatmen. Moreover, they can not go all the way to the sea; they must discharge about 8 miles from Batum, whence their cargoes have to be carried by road. The river can not be relied upon, therefore, as a regular means of communication, but for power purposes it affords every opportunity. A fine macadamized road runs along it, suitable for motor traffic, but the valley will be opened up only when the long-projected railway is built.

The Tchorokh district is eminently mineralized, chiefly with copper ores, and there is scarcely a side valley in it in which copper or other ore outcrops do not exist. The valley of the tributary Murgul River and its immediate environs contain 50,000,000 to 100,000,000 tons of ore containing about 3 per cent of copper. The veins are generally in porphyry and Cretaceous sandstone, and the ores appear as sulphides.

Dzansul Mine Most Important in Tchorokh Zone.

The most important exploitation of this district and of all Georgia is that of Dzansul, belonging to the Caucasus Copper Co. (Ltd.), a British-American concern. This mine is at the head of the valley of the Murgul River, which flows into the Tchorokh from the western side. It is reached from Batum by the highroad leading to Bortchka (30 miles), crossing the Tchorokh River by a wire-rope ferry (which will be replaced by an iron bridge to be built by the Government) and skirting the river southward for 2 miles to the entrance of the Murgul Valley. From this point the company had to build its own road to Dzansul, a distance of about 10 miles, where there was formerly only a precarious horse track. This road now leads to the smelting works on the banks of the river, but the mines themselves are situated about 3,000 feet above them and 4,500 feet above sea level, so that a further zigzag road about 6 miles long and adapted for wheel traffic had to be constructed. The transportation of the ore from the mine down to the works, however, is effected by an aerial ropeway about 2½ miles in length.

Serious exploration work was started in 1900, when the present company was formed; and it resulted in the opening up of probably the largest connected ore body known in eastern Europe, measuring some 160 by 330 by 1,000 feet.

This is covered by an overburden of clay and alluvium between 50 and 100 feet in thickness, which is removed by mechanical and hydraulic means, so that the ore can be worked in open case at very small expense. The ore consists of chalcopyrite and some bornite, mixed with iron pyrites in quartzite gangue, and assays approximately 3 per cent of copper on the average. Its quantity is considerable; in 1914 there were some 4,000,000 tons in sight.

The mine and works are provided with the most modern appliances, ample power being available in the Murgul River, which supplies the electric current for the mines and the concentration and smelting works. The latter are situated near the river and are able to produce about 1,000 tons of concentrates per day, which are then smelted and refined. The workmen and the staff connected with the works are housed near the river, while a great number of buildings have also been erected near the mines for offices, stores, shops, dwellings, etc. Motor transports make connection with Batum.

The treatment of the ore proved a serious problem, and the methods adopted at the beginning of the exploitation were found to be unprofitable. The initial plant was, therefore, scrapped in 1905, and the wet-concentration method was introduced, which gave satisfactory results. The daily capacity was afterwards increased to 1,000 tons. For saving the former losses in the slimes and tailings a minerals-separation plant was also added in 1913, dealing with about 400 tons per day, so that all the difficulties seemed solved when the war broke out. The first consequence was that the Laze workmen returned across their frontier, which is only a few miles distant from Dzansul. Nevertheless, the exploitation continued until November, 1914, when a Turkish force invaded the valley and the works had to be shut down. The Turks were driven out again in March, 1915, without having done much damage, but the mine has been idle ever since. Nevertheless, it has all the elements for becoming in the course of time one of the largest copper producers in eastern Europe.

The production of this mine amounted to 3,030 tons in 1911–12, 2,992 tons in 1912–13, and 3,936 tons in 1913–14.

Neighboring Deposit—Analysis of Ore.

About 6 miles above Dzansul, on the Murvan River, an affluent of the Murgul River, another copper deposit has been located and to a certain extent explored. Its nature is the same as that of Dzansul, and the exploration, carried out by means of galleries and drill holes, has disclosed so far in three different places stocks of sulphide ores existing at the contact between sedimentary rocks and quartzites. The drilling, without reaching bottom, has proved the existence of at least 100,000 tons of ore, and this in only a small part of the deposits.

The following is a typical analysis of the ores coming from this region:

	Per cent.		Per cent.
Copper	19.80	Lime	1.00
Iron	25.70	Silica	20.50
Sulphur	28.40	Gold and silver	traces
Aluminum	3.50		
Magnesia	1.10	Total	100.00

Kvartzkhana Mine.

The second mine now in exploitation and likely to acquire importance in the Tchorohk district is situated at Kvartzkhana, about 37 miles from Batum and only 10 miles from Dzansul. It has the advantage of being situated on the right bank of the Tchorokh and only a short distance from the highroad, so that no extensive road making was necessary. The original outcrops occur on a high, and in places, a very steep hill between the gorges of the Betauli and Kvartzkhana Rivers, which unite below the hill and flow into the Tchorokh.

The mountains in this part of the Tchorokh Valley form a part of the Pontic Ridge, which extends westward toward Lazistan and eastward to the sources of the Kura River. The central portion is formed of granite, which crops out near the town of Artvin, and which lower down the river is replaced by porphyry, and then by clay slate and schists, traversed by quartz-like sandstone.

The gorges of Betauli and Kvartzkhana, which open out on the Tchorokh River, and the lower slopes of the river itself, consist of clearly defined formations of clay schists and sandstones, while in the upper parts of the gorges chiefly porphyry formations crop up. Among the latter a large mass of quartz is noticeable, which is probably connected with a large similar outcrop occurring opposite Artvin. This mass in many places is more or less metalliferous

and contains chalcopyrite, copper glance, green and blue malachite, and also galena and zinc blende. The original exploration work was executed in the clay schists containing the beds of quartzose sandstone in which the metalliferous veins are found. These strata of sandstone occur in succession at varying distances within a lode from 200 to 250 feet wide, and, although the outcrops were not of great width, it was evident from their formation that they were connected with larger ore bodies.

These deposits attracted the attention of Siemens Bros., of Kedabek, who began some preliminary exploration work in them, and as it proved satisfactory they secured the mines in 1906 and prepared them for exploitation on a large scale. They had soon proved a considerable ore body containing about 500,000 tons of ore with a content of about 4½ per cent of copper, in the shape of chalcopyrite mixed with iron pyrites, and also about $2 worth of gold per ton.

An aerial ropeway was therefore built from the mine down to the highroad and to the river near Bortchka, where the smelter and refining works are erected, the smelter being able to deal with about 200 tons of ore per day. A considerable part of the staff from the dwindling Kedabek mines was brought over here, as mentioned elsewhere, and the whole installation had only been fully equipped and a considerable quantity of ore made ready for the smelter when the war broke out and the works had to be closed.

On the next hill north of these deposits, near the village Irsa, more large outcrops are known, in similar geological formations, and a great deal of exploration work done on them has proved their value, but they are not yet being exploited.

Other Tchorokh River Deposits—Valley of the Katila.

The western bank of the Tchorokh River, south of the Murgul Valley, is equally rich in copper ores, judging by the numerous outcrops known. For many of them preliminary permits were obtained by local residents, but no work was done, so that the claims lapsed.

Mention may be made of the valley of the Katila River, which falls into the Tchorokh below Artvin. Within 5 miles from the Tchorokh there are at least nine promising outcrops of chalcopyrite of the usual formation in this zone They are at Nadjvia, at Tzild Deressi, where a vein of about 12 inches crops out in yellow sandstone; at Satovo Deressi, about a mile from the river; at Kepketa-Kepri, Elel Ogli, Sholab Ogli, Degir Bandi, etc., all near the Katila and Tchorokh Rivers, so that they could easily be made accessible. Higher up in the valley similar conditions prevail at Porosseti, Nirvana, and Nakerav, which last village is surrounded by mountains 9,000 and 10,000 feet high.

Copper must have been actually produced by the ancients on the Kuapta Mountain, about 2 miles southwest of the town of Artvin, where the usual remains of old workings, slag heaps, etc., abound.

Khod-Eli Mines in Tchorokh Valley.

In the highest and most remote part of the Tchorokh Valley, 90 miles from Batum, are the mines of Khod-Eli, inclosed by mountains of volcanic origin and consisting partly of columnar basalt. They must be very ancient, judging from the slag and antiquities found there. The vein is 30 inches wide, consists of quartz with chalcopyrite through porphry, and contains about 5 per cent of copper. In recent years the mine had a smelter attached to it, the ore being first roasted in heaps in the open. The matte produced was then carried on horseback to the Tchorokh River, and on it by boats, when the conditions allowed it, to a small refinery at Erghi, near the mouth of the river and about 8 miles from Batum, where the matte was finally treated. Principally on account of the difficulties of transport, the mine had to be shut down, but it has lately been taken up again by new capital and a new plant has been erected, which produced between 450 and 700 tons of copper per annum before the war.

Resources of Lower Valley—Deposits near Bortchka.

The lower parts of the Tchorokh Valley below Dzansul are not less rich in metals but they have not yet been exploited.

One of the most interesting deposits occurs about 8 miles below Bortchka, only 24 miles from Batum and easily accessible. The outcrops cover an area of about 1 square mile. Some of them were worked in a small way about 20

years ago, and the ore was sent to the smelter at Erghi, previously mentioned. But the owners of the concession could not exploit the mine on a sufficiently large scale and therefore continued with exploration work only, in order to test the outcrops. For this reason this deposit is now well known and merits attention. During the investigations 17 different outcrops were followed by galleries of various lengths, the most important one being about 150 feet. They disclosed at least 13 separate veins, varying in thickness between 6 inches and 7 feet but averaging about 20 inches. The ore is generally chalcopyrite in quartz, in places also malachite, and the ore extracted from the different galleries contained, on an average, 8.70 per cent of copper. All the veins in the center of the field run in the direction of a mountain, forming its northwest corner and rising to about 1,000 feet above the level of the valley. Outcrops of the same nature are found also near the top of this mountain, and all the experts who have visited the place therefore assume that the veins converge and form an important ore body in the center of the mountain. So far no work has been done to test this theory, but some enterprise in this direction seems indicated. This mine has the further advantage of being more accessible and nearer the port of Batum than almost any other in the Tchorokh Valley.

About three-quarters of a mile northeast of this field there is another large outcrop of copper ores, and its direction and general geological condition make it probable that it is connected with the mountain described.

The width of this lode between selvages is 10 yards, and it consists of a vein of 1 yard of quartz containing chalcopyrite, marcasite, and zinc blende at the roof. The floor is formed by a vein more than 3 yards thick, of quartz impregnated with chalcopyrite. In the center between these two veins there is a third one about 40 inches thick, also of quartz with chalcopyrite. This large lode, which is visible at the bottom of a creek and again at a considerable height above it, has been explored only at the surface but should be more closely investigated, as it seems to contain large ore bodies.

Zinc Vein—Continuance of Deposits into Lazistan.

In the same valley another vein is known in which zinc predominates, at least near the surface. It is about 28 inches wide and consists of zinc blende with incrustations of chalcopyrite, and the gangue, consisting of quartz, is also impregnated with the same minerals. Analyses of samples showed 42 per cent zinc and 1 per cent copper. No exploration work has been done on this vein, but it has been superficially traced at the bottom of a creek and again 500 feet farther on and 175 feet above the first outcrop.

The valleys containing these deposits, as well as that of the Tchalt River ending at Bortchka, are all commanded by the Kara-Shalvar Mountain, 5,000 feet high, whose western slopes extend into Lazistan down to the Black Sea, near Khopa, Arkhavi, and Veronet. As might be expected, the geological formation in the valleys of Lazistan is the same as in the Tchorokh Basin and the mineral veins continue across the mountain chain, cropping out again in the same profusion. Prospecting was going on before the war near Khopa and Arkhavi, and copper and zinc outcrops are known to exist in Lazistan as far as Rizeh and Surmeneh, besides the manganese ore already mentioned. These ores have not been worked.

Copper Belt Between Imerkhevi and Akria Rivers.

Returning to the eastern bank of the lower Tchorokh Basin and especially to the upper valleys of its tributaries, we find there another important copper belt between the Imerkhevi and Akria Rivers in Georgia. This must formerly also have been a busy mining center, as most of the outcrops have been laid bare by old workings, and slag heaps abound.

The principal ore found everywhere is chalcopyrite, sometimes also malachite, and the outcrops are in the Jurassic formation. In several places great numbers of veins run parallel and may be followed over hundreds of yards, their widths varying between a few inches and 6 feet. Samples taken from them were rich in copper and contained also some gold.

As only superficial investigations have been made in recent years, full details of all the occurrences are not available, but enough is known to show the desirability of closer investigation.

Adjara and Tchaklis River Valleys.

The valley of the Adjara River, which falls into the Tchorokh about 10 miles from Batum, contains the deposits nearest to the sea. Two mines were worked

there, near Agara and Merissi, and the ore was brought down to the smelter at Erghi.

The next valleys to the south are those of the Tchaklis River, with its tributary the Akria River. They contain copper outcrops and old mines at the villages Sindiethi, Aghmarthi, Tskhemlana, Tchikunethi, Akria, and Ephrat, all in Georgia, the nearest being only 13 miles and the farthest about 30 miles from Batum.

Drainage Area of Imerikhevi and Its Tributaries.

Southeast of this district, in the territory drained by the Imerkhevi River and its tributaries, most of the villages within a radius of 10 miles can show old mines or outcrops more recently discovered. Mention may be made here only of Inkhreul, Dioban, Kokiethi, Ivethi, Zekiethi, Badsghirethi, Daba, Surevan, Ube, and Andriatsminda in the north, and Tchikhor, Dzios, Sinkot, Dovlethi, Dzetlethi, and Dzkaltzimor in the south.

Some of these mines contain also zinc and lead. For instance, Badsghirethi is known to have been worked for silver by the Turkish Government, and there are still many villagers living who worked there. A more recent analysis of samples drawn from there gave the following results: Copper, 19.02 per cent; zinc, 13.02 per cent; lead, 10.35 per cent.

At Ardala, on the Imerkhevi River, near its fall into the Tchorokh, there also exists a quartz vein with feldspathic rocks traversing porphyry and containing about 6 per cent of copper.

In the same neighborhood, almost opposite Artvin, a powerful quartz vein crops out at the contact of metamorphic sandstone and porphyry; it is about 2 meters thick, and contains iron pyrites mixed with a good proportion of chalcopyrite, but no analysis is available.

Although these numerous deposits situated on both slopes of the Kartchkhal Mountain, which rises to 11,248 feet above sea level, formed once a most important copper-smelting center, they are not worked now and not even well known, because they are not situated on the usual highroads. Nevertheless, they are situated near the sea and in a well-populated district, and they could easily be made accessible for modern traffic and connected with the highroad in the Tchorokh Valley.

Third Copper Zone, Zangesur, Less Important.

The Zangesur district, which forms the third copper-mining area of Caucasia, is less important than the other two. It is situated in the southeastern part of the country, toward the Persian frontier, and its position is rather unfavorable for transport, as the nearest railway station, Evlakh, on the Tiflis–Baku line, is about 130 miles distant. This is the principal reason why the exploitation of this zone is less intensive, but it will undoubtedly expand when better means of transport are available.

Several mines are being worked at present in a comparatively small radius; they were also known to the ancients, who left the usual workings and slag heaps, and even tools. The ore of this zone also is principally chalcopyrite, but copper glance occurs, with admixture, in places, of zinc blende and galena.

The name of the district, "Zangesur," proves that it was well known of old, as it means "sounding brass." The old exploitation was taken up again in 1845, when a small smelter was erected; two more followed in 1851 and one in 1857. But the working remained in a very primitive state until 1904, when the first modern plant was installed at Barabatum.

Synik, Barabatum, and Ugurtchai Mines.

The Synik mine is situated at a distance of only 2 miles from Barabatum and belongs now to the Société Industrielle et Métallurgique du Caucase, which also works Alaverdi. The mine contains some 20 different veins, from 7 inches to 4 feet wide, containing chalcopyrite and some purple ore in quartz gangue, also a small proportion of precious metals. A great deal of money has been spent on this mine and the smelting works, which, as mentioned, are installed on modern lines, but their production has still to be developed. The output was 721 tons of metal in 1909 and 939 tons in 1913.

The neighboring Barabatum mine, although under different ownership, is worked in connection with the Synik smelter, and also receives the required electric current from it. It contains several veins of the same character, of a thickness varying between 6 inches and 2 feet and widening out in places even to

7 feet. The ore is handpicked and then contains an average of 16 to 18 per cent of copper. The small ore is washed in the river and concentrated by primitive means, and the roasting also only takes place in heaps in the open, whereupon the product goes to the Synik smelter. The production of ore is not considerable, some 2,000 or 3,000 tons per year, as the owners are doing mostly exploration work. The mine also contains an old dump heap of some 40,000 tons of slag containing between 2 and 3 per cent of copper, and altogether deserves to be more energetically exploited.

The Ugurtchai mine is worked by Tiflis owners on a fairly wide lode, but also in a primitive fashion. They also have a small smelter, which in recent years produced 500 to 800 tons of copper per annum.

Other Mines in Third Zone.

Other copper mines in this district occur at the villages Agarak, Katara, and Bashkent, the first one possessing a vein about 2 feet wide between diorite and syenite, and containing about 10 per cent of copper and some molybdenite. The Galisur mines, which formerly were well known, have not been worked of late years. On the other hand, new exploration work has been started near Byelokan, where an ore body of apparently considerable size has been discovered.

The district contains several other small producing properties whose only drawback lies in the transport difficulty. Although the railway from Tiflis to Persia runs only 30 to 50 miles west of the mines, no connection is possible in this direction at present, on account of the intervening mountain chain rising to more than 10,000 feet. The only hope of improvement lies in the building of the projected branch railway from the Baku line to the town of Shusha, from which the mines are easily accessible.

Deposits Outside of Three Main Zones—Kazbek Deposits.

The three mining areas described above do not cover all the Caucasian copper-bearing fields. Separate deposits occur also in many other places, especially in Transcaucasia along the main mountain chain. The eastern part, between Telav and Zakataly, is fairly rich in quartzose veins containing chalcopyrite and iron pyrites, notably at Pshaveii, Zakataly, and other places. They vary in width between a few inches and several feet, but in general they seem too poor or too difficult of access for successful working and they have not been touched.

The Kazbek group of mountains in Transcaucasia contains at least two considerable deposits of copper ores. The first one lies on its northern slope on the left bank of the River Terek, and although situated at a high altitude, it presents no special difficulty to the extraction of the ore. The country rock is formed of nearly vertical strata of gray granites and porphyries and almost black schistose diorites, and the metalliferous veins run along the latter. Their gangue consists of quartz or calcite impregnated with chalcopyrite. Considerable exploration work has been done on the deposit and seven veins have been fully traced at different levels. Their width varies between 8 inches and 7 feet, widening in one place even to 14 feet. The extension of at least two of them has been exactly determined over a length of 940 and 700 yards, respectively, and at levels differing by 700 feet. The ore existing in them is estimated at 1,000,000 tons, containing an average of 9 per cent of copper. The quantities contained in the other veins have not yet been ascertained, but all of them extend much farther in depth and crop out again about 4,000 feet lower down on the mountain side.

The extraction of the ore will be easy by means of adits at different levels, and there is no difficulty in building an aerial ropeway for its transport to a smelter to be erected at the foot of the mountain. Fuel can easily be brought from Vladikavkaz, a distance of 27 miles. In this regard this mine is much better placed than those in the south of the country.

The second deposit on the Kazbek occurs a few miles distant from the first, in a side valley on the eastern bank of the River Terek and at about the same altitude. The geological conditions are also similar; the metalliferous veins consist of quartz embedded in clay schists and contain chalcopyrite with much malachite. Seven or eight of them are known and crop out at different heights, but there is not enough exploitation work done to estimate their contents. However, they extend over such a wide area that there can be no doubt of their

richness in ore. This property is partly covered with forests, which might be used for mine purposes, and considerable water power could be supplied by the stream that flows through it.

Deposits Near Vladikavkaz and in Kutais Government.

In the vicinity of Vladikavkaz four more deposits of copper ores are known but not explored.

Copper ores exist also at lower altitudes in the Government of Kutais, near the River Rion, and two groups of outcrops may be specially mentioned. The country rock is generally dioritic, crossed by thick veins of basalt, quartz, and baryta. The quartz and baryta are mostly mineralized with chalcopyrite and malachite, also copper glance, and in many places the deposits resemble those of the Alaverdi mines. They extend over a wide area on both banks of the river, and old slag heaps prove that they were formerly worked, but in recent times they have been lying entirely idle.

Mineral District Near Black Sea.

Farther west a most interesting mineral district lies near the Black Sea, only about 25 miles from Batum. It covers an area of about 40 square miles and contains, besides copper, also zinc and lead, as well as manganese and iron. It seems surprising that in spite of their favorable position these deposits were never worked and are even scarcely known.

The surface formation consists mostly of gray or white clays, the products of the decomposition of porphyritic rocks, which on washing give galena, blende, and chalcopyrite. Quartz, which in other parts forms the usual gangue of the veins, is here almost entirely absent, and iron pyrites forms only a very small proportion. One of the outcrops consists of two parallel veins, the upper one about 9 inches wide, the lower one 3 to 28 inches; they are divided by a bed of kaolin and can be worked together. The mineral extracted from them is solid, and an analysis gave 8 per cent copper, 40 per cent zinc, and 20 per cent lead. Other samples contained 7 to 16 per cent copper; in some there was more lead than zinc, even up to 60 per cent of the former in the metallic state.

The veins from which these minerals come, as it is clearly shown in other outcrops, can be reached by a gallery of about 140 feet driven through the kaolin; its cost would easily be paid by the ores recovered.

A further vein crops out directly about a mile from the above; it is a pure vein in porphyry, more than 15 inches in width and contains 7 per cent copper, 48 per cent zinc, and 8.5 per cent iron pyrites, practically without any silica. The conditions for working it are also very favorable. Several other outcrops of a similar nature are known, but have not been explored.

Manganese ores also are found in this district, either in the shape of rocky outcrops or weathered in grains mixed with the surface earth over large areas. The pyrolusite taken from the outcrops was found to contain also some iron, but its depth is not known. At a distance of about half a mile from the manganese there are very considerable outcrops of magnetic iron ore of great purity and remarkable magnetic properties.

These two deposits might together form the center of a metallurgical industry for the production of ferromanganese, zinc, and lead. In view of their proximity to the sea, only 20 and 25 miles from two ports, the fuel question here would not make any difference, and there is no doubt about the presence of large quantities of ore, while several rivers could supply power.

Many other outcrops of copper veins are known between the Black Sea and the western part of the Caucasian main chain, but they are not explored. A very considerable one is said to exist above the monastery of Novo Aphon near Sukhum, Georgia, and samples received from there proved very rich, consisting of copper glance, which contained 50.25 per cent of copper.

Number of Mines—Output of Copper Ore and of Refined Copper.

The number of copper mines in the Caucasus from 1911 to 1914 was as follows: Mines with their own smelters—15 in 1911 and 1912, 16 in 1913, and 14 in 1914; mines without smelters—17 in 1911, 14 in 1912, 21 in 1913, and 14 in 1914. The output of copper ore from all the mines was 237,415 tons in 1910, 324,098 tons in 1911, 319,469 tons in 1912, 359,674 tons in 1913, and 238,954 tons in 1914.

The output of refined copper in the Caucasus during the years 1901 to 1917 (first half) is shown by the following figures (in long tons):

	Tons.		Tons.		Tons.
1901	3,989	1907	5,003	1913	10,136
1902	3,440	1908	4,820	1914	8,259
1903	4,240	1909	6,311	1915	[a]3,830
1904	4,785	1910	7,695	1916	[a]4,400
1905	3,707	1911	8,346	1917 (Jan.–June)	[a]2,800
1906	3,829	1912	9,657		

Principal Firms—Relation of Caucasus Output to Total for Russia.

The output of the largest producers from 1911 to 1914 was as follows:

Companies.	1911	1912	1913	1914
	Tons.	*Tons.*	*Tons.*	*Tons.*
Société Industrielle et Métallurgique du Caucase	3,990	4,315	3,721	4,071
Caucasus Copper Co. (Ltd.)	2,208	3,060	3,322	2,892
Siemens Bros	1,551	1,435	1,272	791

Other large companies were the Mezilik Azariantz Works, the Kondurov Works, and the Grielsk Co.

The production of copper ore in the Caucasus for 1912 and 1913 was about 31 per cent and of copper about 30 per cent of the total quantities produced in Russia.

Silver, Lead, and Zinc.

The average share of the Caucasus for 1912 and 1913 of the total quantities of silver and lead produced in Russia was as follows: Silver, about 24 per cent; lead, about 96 per cent; silver and lead ores, about 56 per cent.

There are many silver mines in the Caucasus, but of these only the Sadon mine has been exploited. The ore from this mine contains lead sulphide and zinc blende. Prior to the war the joint-stock company "Alagir" was interested mostly in producing zinc from the ore and, therefore, silver and lead were produced as by-products. The output of the by-products of zinc for 1904 and 1909 to 1914 was as follows:

Years.	Ore mined.	Ore smelted.	Lead obtained.	Silver obtained.
	Poods.	*Poods.*	*Poods.*	*Poods.*
1904	2,004,000	60,000	39,137	56
1909	1,434,000	96,457	48,056	155
1910	1,495,000	120,008	64,691	153
1911	1,374,000	79,321	68,175	127
1912	1,747,000	184,612	95,434	257
1913	1,569,000	125,455	80,672	241
1914	725,000	110,284	63,186	136

Besides the Sadon mine, there are other silver-lead mines that have been surveyed, such as that belonging to the company "Elborus" along the upper reaches of the Kuban River. For 30 versts (about 20 miles) there are veins of silver, lead sulphide, and zinc blende 3½ feet thick. The content of lead sulphide in the ore runs as high as 19 per cent, of zinc blende, 16.5 per cent, and of silver, 0.05 per cent. This mine is provided not only with ore but also with fuel, as coal fields are situated some versts away.

[a] Torgovo Promyshlennaya Gazeta, May 9, 1918.

There can also be mentioned here, as of importance, the mines of the Terek Mining Co. in the Terek Territory, and mines of other companies in the Sukhum district, Kutais Government, and in the Government of Erivan.

After the zinc ore from the Sadon mine is washed at the Mizur mill and put through other processes that remove some of the waste and increase the proportion of zinc, it is sent for smelting to a works in Vladikavkaz. The production of zinc in this works for the years 1910 to 1914 is shown in the following table:

Years.	Ore smelted.	Zinc obtained.	Years.	Ore smelted.	Zinc obtained.
	Poods.	*Poods.*		*Poods.*	*Poods.*
1910	369,140	134,734	1913	446,228	179,940
1911	366,034	139,445	1914	400,888	146,955
1912	523,476	180,239			

Cobalt and Nickel.[a]

There are several deposits of cobalt and nickel (chiefly cobalt) in the Government of Elisavetpol in the neighborhood of the Kedabek copper mines. The most important lies at Dashkessan, and belongs, like the adjoining iron mine, to Siemens Bros.

The cobalt ore forms irregular nests with epidote, garnet, and hornblende in a porphyritic rock, which incloses at the same time magnetic iron ore and occassionally galena and zinc blende. The walls of these nests are themselves colored by the cobaltine.

Analyses of the mineral gave the following results:

Component materials.	Analysis I.	Analysis II.	Component materials.	Analysis I.	Analysis II.
	Per cent.	*Per cent.*		*Per cent.*	*Per cent.*
Cobalt	17.90	17.55	Iron	1.44	9.85
Nickel	.22	.26	Arsenic	35.97	31.63
Copper	.21	.....	Rock	44.26	40.71

In recent years the extraction has been almost stationary, amounting to about 12 or 15 tons per year.

Antimony.

Antimony ores are not of frequent occurrence in Caucasia and the deposits known are not worked; all of them are found in the higher parts of the main mountain chain in Georgia. One occurs near the Gorbalo Mountain, northeast of Tiflis, and shows two veins of stibnite in clay schists, samples containing over 60 per cent of metallic antimony. The same kind of ore exists also near the Kazbek Mountain, where it was accidentally uncovered by a landslip that happened some years ago. Samples taken from it contained 68.66 per cent of metallic antimony but no arsenic, nor lead, nor gold. Small quantities of ore were then extracted by the peasant owners of the land, but no proper working ever took place. An examination of the place by experts would certainly be worth while. The third deposit is known in Svanetia, near Utzeri, northwest of Kutais, Georgia. The veins here also lie in clay schists and were formerly worked in a small

[a] The sections on cobalt and nickel, antimony, and sulphur were adapted from Ghambashidze's Mineral Resources of Georgia and Caucasia.

way but have now been idle for many years, probably on account of the generally low prices obtained for antimony ores before the war.

Stibnite occurs also in North Caucasus, in the village Kholondoi, near Grozny. Samples from there contained 61.6 per cent of metal, but further details about the deposits are not available.

As the value of antimony ores has risen enormously and is likely to remain at a high level, the exploitation of these mines could now be taken up or resumed on a very profitable basis.

Sulphur.

The most important deposit of native sulphur known in Caucasia occurs in the Government of Erivan, about 30 miles from the railway line running to Persia. It is comparatively easy of access, the greater part of the road from the railway passing through a well-cultivated plain, whence the mountains rise gradually.

The deposit has been opened up only superficially and beds of sulphur have been disclosed in two adjacent creeks through which small rivers have cut rather deep winding courses. The sulphur occurs either as crystals in beds of gypsum or as amorphous masses in metamorphic limestone. Many of the crystals are well-developed, almost transparent, and up to 1 inch long, while the amorphous minerals permeate the cavities and pores of the limestone. The deposits are confined to the more recent sedimentary strata and are specially associated with the gypsum and marls of the saliferous deposits and with similar rocks of the Tertiary period.

In the first valley there is an outcrop only about 100 yards from the main road and showing on both sides of the creek; it dips vertically and forms a bed 8 feet in thickness, carrying 40 per cent of sulphur. At a short distance up the valley another outcrop is seen, 2 feet wide, of practically pure sulphur. Farther up in the valley three more outcrops occur, of widths ranging between 2 and 5 feet; they contain about 40 per cent sulphur, except one, which seems very rich indeed, as clear sulphur was exposed on opening up the outcrops. Altogether in this valley there are 5 distinct outcrops, all of good workable width, with the same strike and dip, and carrying sulphur of 40 per cent and upward.

In the second valley there is a very fine outcrop, which strikes into the mountain with a width of over 10 feet and carries over its whole width a value of at least 65 per cent of sulphur. Higher up in the valley there are two more outcrops, 2 feet and 5 feet wide, respectively, containing 35 to 40 per cent of sulphur. East of them, in a deep cutting, there occurs what is probably the richest deposit of all. It has a width of 8 feet and contains pure sulphur over its whole width. It strikes into the mountain and from its appearance should give a large output. Within 100 feet from it there are two more outcrops of good workable widths and high value.

As all these outcrops have been examined only superficially, it is impossible to calculate their total contents with any degree of certitude, but from what has been ascertained so far, about 800,000 tons of sulphur are assured at the surface.

These deposits are richer than those of Sicily, where some ore with as little as 25 per cent of sulphur is extracted. A sulphur refinery established in the Caucasus could therefore compete with Sicily and produce all the qualities of refined sulphur that are now

being imported in southeastern Europe and Transcaspia. The quantities received in the ports of Batum and Tuapse alone amount to about 5,000 tons of raw brimstone, mostly in the shape of flowers of sulphur used in the vineyards of Georgia. The raw brimstone is required for the manufacture of pure sulphuric acid, as the product obtained from iron pyrites, although cheaper, is unsuitable for many purposes of the chemical industry on account of its arsenic content. The use of refined mine sulphur therefore will increase with the expansion of the chemical industry, especially the manufacture of wood pulp by the sulphite process, which was projected before the war.

Sulphur also exists in Daghestan, in the Samur district, but it is difficult of access; and the same may also be said of the deposits known in the Askhabad district of the Transcaspian territory, which are situated far from any means of transport.

Pumice Stone.

Among the mineral resources of the Caucasus are some large deposits of pumice stone in the Province of Kars and some smaller ones in the neighboring Government of Erivan. The only one that had been worked before the war is located 7 versts (about 5 miles) from the town of Kars, where the stone occurs in large pieces. Later two large deposits of small pieces, each about a square kilometer in area, were discovered about 40 versts (27 miles) from Kars. Here borings were made to a depth of about 40 feet without reaching the bottom, and it is estimated that each contains about 180,000 short tons.

A concession to work the first-mentioned deposit was granted by the Russian Government in 1909 to an engineer in Tiflis. The concession was for 16 dessiatines (about 43 acres). Only about one-quarter of this area contained any pumice stone, and the deposit was nearly exhausted in 1913. In the immediate vicinity, however, another deposit of good, large pieces of pumice stone was found. During the first four years that the first deposit was worked about 361 short tons were obtained each year, or a total of about 1,444 tons.

Some 300 workmen were employed the first year prospecting and starting operations, and after that about 50 men carried on the work. Most of them were Armenians, Greeks, and Molokans. The work was carried on with picks and shovels, and the men averaged about 144 pounds per day for the large pieces, while for the small pieces and powder the amount varied considerably, ranging from 36 to 542 pounds per day. All the pumice stone, whether large or small pieces or powder, contained about 25 per cent of water and about 25 per cent of sand or gravel, so that after being cleaned there was left for use only about half of the gross product.

Under the former concession the Russian Government received 36 cents per 100 pounds, regardless of the quality of the stone, whether consisting of large or small pieces, whereas it is said the Italian Government takes only one-half that amount for the large pieces and small amounts for the small pieces, varying according to their size.

Coal Deposits—Small Output—Cement Industry.

Coal is found in the Kuban Territory and in the Province of Kutais, the principal region being the Tkvibuli, 20 miles from the town of Kutais, according to the Russian Yearbook. The quantity

produced is small, and the quality very inferior. It does not bear carriage and therefore has to be briquetted. It yields a dense, strong coke used for smelting pig iron and for general metallurgy.

Other coal deposits are situated at Olty and near Tchartala, in both of which localities very rich varieties, somewhat similar to Welsh coal, are stated to exist. The Olty coal mines, however, can not be advantageously worked until cheap and easy means of transport to and from the district are provided. The coal field at Tchartala is not far distant from Poti, to which port a narrow-gauge railway could be constructed without much difficulty, but in this case lack of capital has precluded the exploitation of the mines.

The output of coal in the Caucasus for the years 1911 to 1915 is as follows: 1911, 13,571 tons; 1912, 69,917 tons; 1913, 69,344 tons; 1914, 66,122 tons; 1915, 56,252 tons.

Rich deposits of clay marl (a natural mixture of clay and lime) are found along the coast of the Black Sea and near Novorossiisk, and here are a large number of cement works.

The largest number of cement works is situated in South Russia and the Caucasus, which have 29 out of a total of 69 works for the whole of Russia. The predominating power used appears to be steam. Cement is usually packed in barrels.

Sulphate of Soda—Asbestos—Asphalt—Other Minerals.

Sulphate of soda is found in the Batalpashinsk district of the Kuban Province, but exploitation on a large scale has not begun.

Asbestos is produced in the Caucasus in an insignificant quantity in the Sharopan district of the Kutais Government, at the Vzhinevi asbestos mines. In the same Government of Kutais, asbestos is known to exist far from the deposits already named, to the northwest, in the Letchgumsky district, in the Svanetsky police circuit. It is also found in the extreme southeastern corner of the Caucasus, not far from the Persian frontier, 12 miles from the town of Shusha.

Asphalt extends over a considerable area in the Caucasus, appearing in the form of nests, and more or less important deposits in old and new alluvial formations. In all those deposits there are petroleum outcrops. In spite of this extent of asphalt there is little production. There was an important field at Notanebi on the Batum Railway, where boring for oil is being carried out at present. Asphalt is also produced in the Government of Tiflis, in the district of Signakh. This Caucasian asphalt is consumed locally.

In the Caucasus there are also quicksilver, salt, excellent bitumen (on the Black Sea coast), and iron ore (Tchatakh mines in the Bortchalinsk district of the Government of Tiflis and the Dashkessan mines in the Government of Elisavetpol). The total supply of ore in the Dashkessan mines is about 800,000,000 poods (12,900,000 long tons). A part of these mines was surveyed by Siemens Bros., who found a supply of 400,000,000 poods (6,450,000 tons) of ore containing 60 per cent of iron.

Famous Mineral Springs of the Caucasus.

Mineral springs are abundant in the Caucasus, and together with an excellent climate and beautiful scenery, make the Caucasus an exceedingly fine center for health resorts. More than 50 mineral springs are located in the famous group "mineralnya vody," which are located

at the following towns: Pyatigorsk, Jeleznovodsk, Essentuki, and Kislovodsk. These towns are united by railroad and are so close to one another that the time consumed in journeying from one town to the other is less than one hour. No other locality is known where springs of so many different kinds occur in such close proximity. This group is situated in a picturesque mountainous country occupied by spurs of the main Caucasian ridge. Kislovodsk is renowned for its spring Narzan, which in the native dialect means "spring of the brave." For years past this water has had a wide reputation, and of late years it has become a favorite table water in Russia. It contains sulphates of soda, potash, and magnesium; carbonates of soda, lime, and magnesium; chlorates, and traces of bromide, iodide of soda, etc. There is a real opportunity at Kislovodsk for more and better hotels. Jeleznovodsk is renowned for its ferruginous springs, the Russian name meaning "iron water." Pyatigorsk, which means "five-mountain town," has a number of sulphur springs, while Essentuki possesses numerous alkaline sources. The mineral water of Borzhom, a spring well-known throughout Russia, not only is used at the source but is put up in bottles and shipped to all parts of Russia and abroad. The shipments of mineral water from this spring to Russia and foreign countries amounted to 11,000,000 bottles in 1914. Other important mineral springs are Mikhailovski, Goryatchevodski, Abastuman, Anapa, Matsesta, etc.

Water Power.[a]

As the Caucasus is divided by one of the highest mountain chains of the globe, at several points covered by eternal snows, its great number of rivers and streams, shown by the map, might only be expected, and if nature has dealt parsimoniously with the country with regard to coal, it has substituted water power as an inexhaustible source of energy. Through the position of the country between the two seas the length of its rivers is somewhat limited, the longest one, the Kura, attaining 825 miles, while the Kuban and the Terek run for about 300 and 400 miles, respectively. But their fall is considerable, amounting in many places to rapids, and waterfalls in the smaller streams are also very numerous.

Occasions for the erection of hydraulic power stations are therefore to be found in almost every part of the country. The River Kura, between Tiflis and Piras in Georgia, has a fall of about 300 meters (1 meter=3.28 feet), and could give 300,000 horsepower by the use of 100 cubic meters of its water per second. In North Caucasus the River Kuban could produce 175,000 horsepower on 350 meters' fall between Batalpash and Kavkaz Station and a further 45,000 horsepower between the latter station and Ekaterinodar. These figures result from superficial and incomplete investigations only. The many smaller rivers and affluents in their upper reaches have considerable falls and abundance of water all the year round. The streams of Georgia are said to have a potential power amounting to nearly 2,500,000 horsepower in winter and to over 4,000,000 horsepower in summer.

This natural store of energy has scarcely been tapped. The power and light installations now existing in the country are all due to

[a] Adapted from Ghambashidze's Mineral Resources of Georgia and Caucasia.

private capital, which is insufficient for the proper development of this kind of industry.

Hydraulic establishments generating electric current for light and power exist now at the following places: In North Caucasus, near the Station Mineral Waters, there is a power station of 1,000 horsepower. Tiflis, the capital of Georgia, possesses 18 electric stations and substations, the largest ones belonging to the Belgian Tramway Co. and to the Georgian nobility. The Gori electric station belongs to Prince I. G. Amilakvari. Kutais has two stations on the Rion River, for power and light. Adzhamethi, near Kutais, Borzhom, Akhaltzikh, and Akhalkalaki have local stations for lighting. Batum is provided with current from a station built about 10 miles distant in the Tchorokh Valley. Of the Georgian coast towns, Sukhum possesses a station of 600 horsepower about 4 miles inland; New Athos and the meteorological station, Gagry, are also provided with current, the latter from the River Zhokvara.

An ambitious project was worked out a few years ago by an English engineer, who proposed to supply the greater part of Caucasia with electrical current from two generating stations of large dimensions, one of them situated near the Kazbek Mountain and the other in the south near Lake Goktcha, for which purpose concessions were granted to him in 1912. The Kazbek power plant was to utilize the upper Terek River near the Georgian military road, where abundant water and a considerable fall were to produce 40,000 kilowatts, while the water from the lake was to be conducted to the second plant by means of a pipe 4 miles in length and producing a fall of 2,400 feet. By means of these two installations and a network of conductors covering the whole country, high-tension current for light and power was to be supplied to the railways, tramways, ports, factories, mines, municipalities, etc. Unfortunately the execution of this great plan could not be started within the stipulated time, and the concession lapsed.

The water-power possibilities of the Caucasus could be utilized especially in the manufacture of ferromanganese, calcium carbide, and nitrogen compounds for fertilizers, etc., for which the raw materials are already in the country. It has been found also that where cheap electric current is available, all sorts of small local industries spring up, and the Caucasus would doubtless be no exception to this rule, though it is at present an agricultural rather than an industrial region.

A special hydraulic department exists in Tiflis (capital of Georgia), which supervises the whole utilization of water power on Georgian territory.

Caucasus Railway Facilities.

The principal railway lines in the Caucasus are the following: Vladikavkaz Railway, the main line of which extends from Rostof-on-Don on the Azof Sea to Baku on the Caspian Sea and which has many branches to various important trading centers; and Transcaucasian Railway, the main line of which extends from Baku, via Tiflis, to Batum on the Black Sea and which also has numerous branches.

The length of the Vladikavkaz Railway in the Caucasus, including its many branches, which terminate at Ekaterinodar, Novorossiisk, Stavropol, Georgievsk, Prokhladnaya-Gudermes, Gudermes-Kisliar,

Bataisk-Torgovaya, Tikhoretskaya-Tchablievskaya (continuing to Tsaritsyn), is 2,699 versts (1,790 miles). This line is connected with the railroads of Russia. Portions of this railway from Rostof-on-Don to Mineralnya Vody and from Ekaterinodar to Novorossiisk are double-tracked.

The length of the Transcaucasian Railway, together with its branches, which terminate at Samtredi–Poti, Rion–Kutais–Tkvibuli, Mikhailovo–Suram, Mikhailovo–Borzhom–Bakuriani, Sharopan–Tchiaturi-Satchkheri, Tiflis-Djulfa, Alexandropol-Kars-Sarykamysh, is 1,814 versts (1,203 miles).

The Black Sea–Kuban Railway (Ekaterinodar–Primorska–Akhtyskaya–Krymskaya–Kutchevska) is 387 versts (257 miles) long. The Kakhetinskaya–Tiflis–Telaf line is 140 versts (93 miles) long. The length of the Armavir–Tuapse line, with its two branches, is 221 versts (147 miles). The Yeiskaya Railway, from Yeisk to Sosyka on the main line of the Vladikavkaz Railway, is 133 versts (88 miles) long.

The total length of all railroads in the Caucausus in May, 1916, was 5,394 versts, or 3,576 miles, averaging 2 miles per 100 square miles, which is less than one-fourth of that of the United States, and 25.5 miles per 100,000 inhabitants (the population of the Caucasus in 1916 can be figured at 14,000,000), which is one-tenth of that of the United States. In the United States the figures for the same year were 8.55 miles per 100 square miles and 250.3 miles per 100,000 inhabitants. Except the Transcaucasian line, all the Caucasian railways were owned by private interests.

Extensions, New Lines, and Plans for Railroad Construction.

In 1914 work was started on the Black Sea Railway from Tuapse to Kvaloni (station on the Transcaucasian Railway line) for a distance of 215 miles, but it was suspended owing to war conditions. This line runs along the coast of the Black Sea at a distance of 200 feet inland. There are plans to extend this line to Novorossiisk–Kertch (through a bridge over the Kertch Strait), connecting it with the railways of Russia, and also extending it to India, which would thus make it become a rival of the famous Bagdad Railway. Some progress was made during 1916 on the Novo-Senaki-Sukhum section.

The Russian Yearbook gives the following plans for new railroad construction in the Caucasus:

The Committee for New Railways in 1916 examined various projects relative to the construction of new lines in the Caucasus, with the object of facilitating communication between that district and Central Russia. The first proposal was the construction of a line from Prokhladnaya (on the Vladikavkaz line) to Kozlof, a distance of about 1,160 versts (769 miles), which would shorten the journey from Moscow to the Caucasus by about 250 versts (166 miles).

The Government engineers who made the surveys recommended two routes: The first from Avtchaly, on the Transcaucasian Railway, via the Arkhotsk Pass to Slyeptsof, on the Vladikavkaz main line. The other alternative, from Vladikavkaz to Tiflis, following the Georgian military road, would be longer and more costly. The cost of the former route was estimated at 101,523,988 rubles and of the latter at 104,216,312 rubles, exclusive of rolling stock and the electrification of the line, which was sure to be done in view of the abundant supply of water for hydroelectric purposes.

The Russian Government sanctioned the formation of the Southern Caucasian Railway Co., the object of which was to carry into effect the long contem-

plated project of constructing a railway from Borzhom to Kars, with a branch line to Olty on the Turkish frontier. The railway and its branch were to be approximately 351 versts (230 miles) in length and were estimated to cost 62,000,000 rubles. The territory through which the railway will pass is reputed to be rich in agricultural and mining possibilities. One of the concessionaires owns a very extensive coal field at Olty, which is said to contain a practically unlimited supply of good coal for steam and other fuel purposes.

A company was formed for the construction of a standard-gauge railway from the station of Alyat, 43 miles from the junction of the Vladikavkaz and Transcaucasian Railways at Baladzhari, through Salyan and Lenkoran, to Astara on the Persian frontier. The scheme also provided for the subsequent extension of this line from Astara through Persian territory, touching the more important commercial centers of that country. The estimated cost of the railway was nearly 13,700,000 rubles, which it was proposed to raise by the formation of a company with a capital of 14,000,000 rubles. This railway was intended to form the connecting link between the Russian and trans-Persian systems.

The Tabriz-Djulfa Railway, with its branch from Sofyan to Sherefkhani on Lake Urumiah, was completed in 1916 and opened to traffic about the middle of the year. The Shahtahti–Maku–Bayazet, or Alashkert, Railway was also working as far as Bayazet before the close of the year. This line is being extended southward in the direction of Lake Van. The Batum–Trebizond Railway was begun about August, 1916, and by the end of the year work on several sections of the railroad was reported to be advancing favorably. The Baku–Djulfa, or Araxes Valley, Railway progressed fairly rapidly in 1916, and much work in connection with earthworks and bridging was completed.

Market for Agricultural and Other Machinery.

There is a considerable field for the introduction of agricultural machinery in the Caucasus. Agriculture is the leading industry of this entire region, but even in the more settled parts of Transcaucasia the peasants may be seen to-day plowing with crooked sticks. All their implements are most primitive. There is some improved agricultural machinery used in North Caucasus, most of which came from Germany and the United States, but no statistics are available to show the amount imported from the latter country.

The various agricultural societies are doing good work in introducing modern agricultural implements and in keeping small stocks in their stores, such as iron shovels, forks, hand mills for grinding corn, pulverizing, etc. They are also introducing chemical fertilizers and disinfectants.

American manufacturers of machinery must bear in mind that machinery, to suit local requirements, should be extra strong and not complicated. They should insist that agents sell machinery adapted to the work for which it is purchased. A case was drawn to the attention of the American consulate in Batum in which a small steam shovel, used in the United States for light ditch work, was sold for digging out iron ore. The consequence was a broken shovel and the seriously damaged reputation of the manufacturer, who in this instance was not informed by his agent of the nature of the work that the machine would be required to perform. This incident is of special interest, because the market for steam shovels in the Caucasus is bound to become of great importance, and manufacturers must assure themselves that agents understand the business sufficiently to see that their customers get the size and type of

shovel suitable for the work required. This is particularly important because some Russian works are in a position to compete in this article.

Hardware, Leather, and Footwear—Other American Goods.

Hardware, leather, and footwear have been imported principally through European commission houses and in many instances have been entered as of European origin. The following articles of American hardware and cutlery are best known in this market: Saws, files, plumbing supplies and pipes, brass fittings, pipe joints, razors, ice-cream freezers, clips, etc. The hardware trade in the Caucasus offers a wide field for expansion to American manufacturers who are able to study local requirements and willing to meet local conditions. American leather and footwear were beginning to obtain a firm foothold in all the principal cities of the Caucasus; the sudden stoppage of imports toward the end of the year 1914 created a serious crisis in this trade. Most of this trade was handled, however, through European agents. Complaints reached the American consulate that shoes of certain well-known makes were not uniform in quality, and it is believed that many imitations flooded the market.

Among articles of American origin imported to this market in 1914 on a limited scale are musical instruments, chemicals, electrical supplies, refrigerators, photographic appliances, toilet requisites, and groceries.

The value of American goods sold in the Caucasus in 1914 is estimated at $4,000,000 to $4,500,000, showing an excess over exports to the United States of $2,238,000 to $2,738,000.

Exports from Batum to United States.

The declared exports to the United States invoiced at the Batum consulate during the five years ended in 1917 were as follows:

Articles.	1913	1914	1915	1916	1917
Almonds	$22,913	$64,796			
Antiquities		543			
Casings, sheep	1,785	521	$53,266	$48,467	$19,615
Glue stock	174				
Licorice root	1,023,184	433,309	235,247	52,029	
Manganese ore	658,987	199,923			
Nuts		13,243			
Potash, carbonate of	52,628	12,312			
Raisins	1,198				
Rugs	184,864	121,655	12,753	198,455	196,143
Skins:					
Goat	6,584	16,790			
Sheep	52,636	50,297			
Sunflower seeds		633			
Tobacco	14,976	8,373			
Wine	159				
Wood:					
Box		1,112			
Veneers	1,892	14,097			
Walnut	246,189	115,754			
Wool	818,581	708,825			
Phonograph records					359
Total	3,119,750	1,762,195	301,266	298,951	216,117

Credit Conditions and Trade Methods.

A point that militates against American products is the lack of credit. It may be taken as an established principle that Russian merchants, under usual conditions, will not pay for manufactured

goods before the goods are received. The usual credits received by local dealers range from 30 days to 12 months from date of delivery. On the other hand, American manufacturers, as a rule, refuse to sell otherwise than cash with order or f. o. b. seaboard. The result of this conflict of customs is to throw American trade with Russia largely into the hands of European commission houses.

One important commercial effect of the war noted in 1914 was the breaking away from trade with German firms, which were numerous and well-established throughout the district. The average local dealer was accustomed to buy German and a large proportion of other foreign goods from German commission houses or agents, who not only solicited orders, displayed samples, and arranged credits, but were also able to work out the price of the goods delivered at the merchant's warehouse. The only mental effort required of the local dealer in placing orders was to choose the goods preferred. Almost any goods could have been sold in the Caucasus toward the close of 1914 if they had been introduced on the market in as thorough and efficient a manner.

Trade with Persia.

The Caucasus has to be considered as a distributing center for new and wide fields of the former Turkish Empire and increasingly so for the Provinces of northern Persia.

Russian trade with Persia continues to increase rapidly. This is due chiefly to Russia's great advantage in having control of the principal routes leading to the several Provinces of northern Persia. The articles exported from and through the Caucasus to Persia include such commodities as sugar, flour, kerosene, and manufactured goods.

The cities of Astrakhan, Baku, Batum, and Tiflis are situated on the trade routes from Russia to Persia. The most important part in this trade is taken by the city of Baku on account of its harbor facilities and advantageous situation on the Caspian Sea. This city has frequent steamship communication with the ports of northern Persia. Other goods from Russia are shipped via Poti or Batum to Tiflis and thence to Djulfa. This trade is materially assisted by the construction of the new railway from Djulfa to Tabriz. If the contemplated railway from Batum to Kars is built, it will be still easier to send merchandise from Russia to northwest Persia.

The goods landed at Baku from Persia in 1912 were as follows:

	Tons.
Cereals	66,262
Cotton seed	20,645
Firewood	12,045
Fish	6,682
Fruit	5,914
Linseed	573
Oil seeds	2,010
Rice	68,135
Timber	2,033
Tobacco and cigarettes	787
Vegetables	601
Walnut logs	2,046
Wool and carpets	6,516
Total	194,249

The goods shipped from Baku to Persia in 1912 were the following:

	Tons.
Building material	1,348
Cereals	1,000
Coopers' goods	338
Flour	9,692
Glassware	660
Kerosene	24,302
Manufactured goods	1,701
Metals	2,095
Sugar	49,796
Tea	14
Total	90,946

Bourse Committees in the Caucasus.

Eight principal cities of the Caucasus have bourse committees, or exchange committees, which correspond very nearly to American chambers of commerce and boards of trade, although their functions are usually more limited. They endeavor to build up trade relations, to introduce modern methods of trade, to obtain municipal and harbor improvements, to obtain desired changes in the tariff regulations, to regulate prices, to settle disputes among merchants, and, in general, to promote the industrial and commercial welfare of the cities in which they exist. They have nothing to do, however, with finances or commercial ratings.

An idea of the functions of the bourse committees in the Caucasus may be obtained from a brief review of the activity of the Batum bourse committee during 1912. This included an attempt to investigate the markets of the Near East; an application to the customs officials to decrease the tariff on wood for petroleum cases, so as to facilitate the export of kerosene to the markets of the Near East; the consideration of the question of loading and unloading vessels in the port of Batum on Sundays and holidays; the consideration of methods of facilitating and improving the conditions of work in the port of Batum and of other needs of commerce and industry; the consideration of the insurance of workmen and of regulating the hours of labor; a study of the question of railway freight rates on manganese ore from the mines at Tchiaturi to Batum; the establishment of a fixed tariff for carrying baggage from steamers; an application to the inspector of schools in the Caucasus to have a commercial school established at Batum, and other matters of timely interest.

Activities of Cooperative Societies in North Caucasus.

The cooperatives play an important rôle in the commerce of the Caucasus. The following data are furnished by the American Committee of Russian Cooperative Unions:

At the end of 1918 there were over 1,000 credit societies and savings organizations in North Caucasus united in various local unions, which in their turn are members of the Southeastern Association of the Unions of Credit and Saving Societies, with headquarters at Rostof-on-Don. The latter is the central purchasing organization for all the credit cooperative societies of North Caucasus. The number of individual members in these cooperative societies exceeds 600,000. The total of the balance sheets of these unions at the end of 1918

exceeded 220,000,000 rubles, while the yearly turnover is equal to 500,000,000 rubles. Various unions of these cooperatives own many industrial undertakings, such as flour mills, factories for making agricultural machinery, and barley-grinding plants. The same unions possess their own warehouses and elevators. The central banking institution for their financial operations is the branch of the Moscow Narodny Bank located at Rostof-on-Don.

There are 3,000 consumers' societies in North Caucasus comprising 1,800,000 individual members. Their cash capital is equal to 20,000,000 rubles, and their yearly turnover for 1918 reached the sum of 300,000,000 rubles. Their importance as distributors and collectors of raw materials can be judged by the fact that there is no more or less important hamlet or Cossack settlement where there is not a consumers' store. The consumers' organization is also operating successfully among the city and working population. There are many consumers' societies in the mining districts, and there is a good number of railroad consumers' societies that have 10,000 members each and 50 to 60 stores with a turnover totaling many million rubles. All the consumers' societies are members of one or another of the 25 big local unions, the most important of which, practically uniting all the others, is the Rostof-on-Don Regional Union of Consumers' Societies, founded in 1913. On December 1, 1918, the cash capital of this regional union was 3,990,000 rubles. The gross earnings in 1918 were 34,645,721 rubles, the trade turnover exceeded 90,000,000 rubles, and the value of the industrial plants is estimated at 13,000 000 rubles. The union has the following departments: Groceries and foodstuffs, leather and shoes, textiles and notions, hardware and tools, paper and office supplies, and agricultural seeds and supplies. Moreover, the Rostof-on-Don Regional Union owns its own workshops for making ready-made clothes, underwear, and hats and has its own fishery, with fish salting and curing plants. Finally, it has three big industrial plants: (1) A nail factory with an output of 9,167 tons of nails per year; (2) a soap factory with a yearly output of 4,000 tons of soap; and (3) also a soap factory ("Milovar"), the biggest of its kind in South Russia, with three sections: (a) Oil-crushing plant, (b) hard-soap factory, (c) soft-soap factory. The annual production is 7,500 tons of vegetable oil, 5,000 tons of vegetable tallow, 15,000 tons of soap, and 500 tons of glycerin. This soap factory is owned in conjunction with the All-Russian Central Union of Consumers' Societies (Centrosoyuz), which holds three-fifths of the shares. Under the auspices of Centrosoyuz the buying of foods is now conducted in North Caucasus on a large scale with a view to supplying Central Russia with dry fruits.

To further foreign trade a new body has been organized by the cooperatives called the Southern Cooperative Council for Foreign Trade (Yuskvet), composed of Centrosoyuz, the Moscow Narodny Bank, and all the cooperative organizations of North Caucasus and the Don Territory. The headquarters of Yuskvet are at Ekaterinodar. Yuskvet is intrusted with the representation of cooperatives before home and foreign Governments, the fixing of the quantities of goods to be imported and exported, and the distribution of goods among the cooperatives. The execution of trade orders abroad is intrusted to Centrosoyuz for consumers' societies and to the Moscow Narodny Bank for credit societies.

Cooperation in North Caucasus has been almost exclusively rural cooperation and unites 80 per cent of the farming population, both Cossacks and peasants. This is because the average landholding is larger in South Russia than in other parts of the country, and the population is correspondingly more well-to-do.

Cooperatives in Transcaucasia.

Unfortunately at present little information is available on the development of the cooperative movement in Transcaucasia. In 1917 there were two large cooperative organizations—one in Baku, called Cooperation, and the other in Tiflis, called the Transcaucasian Union of Cooperative Societies (Zaksoyuz). Each of them unites over 500 cooperative societies with one or more stores. The union Cooperation in Baku counts among its members two societies in Turkestan and two Persian societies in the city of Enzeli. The turnover of this union for 1916 was 2,943,223 rubles. The union has its own printing establishment, publishes a journal, opened a large cooperative dining room called "The Health," and also a cooperative people's house for various educational purposes. This union has its own workshops for manufacturing soap, candy, native cakes, coffee substitutes, and various confections in which grape juice is used instead of sugar. The Zaksoyuz in 1917 had a turnover of 2,901,824 rubles. These two unions unite 14 local unions, each one representing from 10 to 50 societies.

The other forms of cooperation were still less developed in 1917 than the consumers' branch. There was only one credit society in the whole of Transcaucasia.

Principal Commercial Centers.[a]

Ekaterinodar.—Administrative center of the Kuban Province. In 1915 its population was approximately 100,000. This city possesses tramways, electric lighting, waterworks, and telephone service. The inhabitants of the neighboring districts are engaged in growing tobacco and fruit and in fishing. An oil pipe 96 versts (64 miles) in length, which was opened in 1911, brings 150,000 poods (18,000 barrels) of oil daily. This oil is obtained from the Maikop field. There are 10 steam flour mills, 8 oil-crushing mills, 12 brickyards, 8 foundries, 4 breweries, etc., in the city; also about 15 banks and an exchange committee.

Novorossiisk.—Administrative center of Black Sea Government. Its population was about 75,000 in 1915. It has electric lights and a sewerage system. It has an exchange committee and is a center of the grain trade and the cement industry. The most important cement works are the Tchernomorsk Cement Works (capital, 4,500,000 rubles; production, 13,000,000 poods); Tsep (capital, 1,500,000 rubles; production, 350,000 barrels); Titan (capital, 1,675,000 rubles; production, 250,000 barrels); Tuapse-Tchernomorsk Co. (capital 1,200,000 rubles; production, 500,000 barrels); Tauz (capital, 1,200,000 rubles; production, 500,000 barrels), Beton, Pobeda, and Aindar. In Novorossiisk and its vicinity (Bakanskaya, Tonnelnaya, Gaiduk) the production of cement increases each year, and in the near future it may become not only Russia's center but also one of

[a] The data in this section cover approximately the year 1915. The descriptions of Elisavetpol, Kars, and Kutais were taken largely from an article on the economic resources of the Caucasus, published in "Russia" for September and October, 1917.

the world's centers of the cement industry. The quantity of cement in this territory is known to be enormous, and its quality is considered excellent.

The bay of Novorossiisk is sufficiently favorable for anchorage, and the wind "Nord-ost," or "Bora," does not handicap shipping, as is generally believed. There are seven loading piers of which five (including two elevator piers) belong to the railway company, one to the French Standard Oil Co. and one to the Russian Steamship Co.[a] There is accommodation for some 22 steamers. The depth of water at the end of these piers averages 24 to 26 feet. There are two breakwaters. The freight-handling equipment includes cranes of 5, 10, 20, and 25 tons, and a floating crane of 40 tons. There is a grain elevator with a capacity of 6,000,000 poods and storage warehouses with a capacity of 5,000,000 poods. Novorossiisk is connected by rail with Petrovsk and Baku and with the railways of Russia via Tikhoretskaya on the Vladikavkaz Railway.

The principal articles of export through Novorossiisk during the years 1912 and 1913 and the first six months of 1914 are shown in the following table:

Articles.	1912	1913	Jan. 1–June 30, 1914.
	Tons.	*Tons.*	*Tons.*
Cereals	703,742	940,557	844,944
Coal	748	412	175
Flour	135	.....	.....
Licorice root	1,486	3,166	.....
Oak staves	10,140	17,472	9,157
Oil cake	149,828	149,244	73,864
Oil products	213,168	219,462	149,340
Rails	2,675	3,206	.....
Wool	1,140	185	24
All other articles	167,596	38,501	14,710
Total	1,250,658	1,372,205	1,092,214

The exports of various oil products from Novorossiisk to foreign countries are shown in the following table for 1912, 1913, and 1914:

Products.	1912	1913	1914
	Tons.	*Tons.*	*Tons.*
Illuminating oil	41,611	67,000	52,123
Pitch	.....	422	.....
Spirits (gasoline, etc.)	140,288	87,610	57,442
Residuum	19,786	12,223	7,600
Machine oil	.....	6,070	.....
Ligroin	9,344	46,137	32,175
Crude oil	2,139	.....	.....
Total	213,168	219,462	149,340

At Novorossiisk 323 vessels, of 631,299 tons, entered into the foreign trade of the port in 1914, as compared with 419 vessels, of 841,514 tons, in 1913.

Armavir (Kuban Province).—Population, about 60,000; turnover, more than 50,000,000 rubles. It has electricity, waterworks, telephone service, 13 banks, and an exchange committee. There are several oil-pressing mills in this town. It is connected by railway with Tuapse (one tunnel on this line is 4,032 feet long) and is on the main trunk line of the Vladikavkaz Railway.

[a] All data on port accommodations are for the year 1913.

Maikop (Kuban Province).—Population, more than 52,000. This town is the center of the Kuban oil region and has a large trade in tobacco. It has waterworks, telephone service, electric lighting, and banks.

Yeisk (Kuban Province).—Port on the Azof Sea, with a population of 50,000. Its inhabitants are engaged in fishing, the salt industry, and the cattle trade. The length of piers is 2,585 feet; depth, 11.8 feet. It has an exchange committee. It is connected by rail with Sosyka on the Vladikavkaz Railway.

Vladikavkaz (Terek Province).—Population, 85,000; center of exchange with the mountaineers and their cultural center. There are several banks and a mining chemical factory, "Alagir."

In this region there are also *Georgievsk*, with a population of 26,000 and many flour mills, and *Mozdok*, with a population of 14,000, whose inhabitants are engaged in producing wine, growing fruit, and fishing. Both of these towns are on the Vladikavkaz Railway.

Grozny (Terek Province).—Population, 35,000; center of Terek oil region, which is second in importance in the Caucasus.

Derbent (35,000) and *Petrovsk* (18,000).—Fishing centers in Daghestan Province on the Caspian Sea. The cultivation and preservation of fruit have lately been attempted, and extraction of sulphur was started in the neighborhood of Petrovsk. The city of Petrovsk has several refrigerating plants.

Baku (on Caspian Sea).—Population, 350,000; chief center of Russia's petroleum industry. It is a thriving port and a railway terminus. The shortest railway route to Persia lies through Baku. It serves as a distributing center to a large tract of agricultural country in which cotton, rice, tobacco, fruit, and vines are grown. Silk is manufactured. The city is connected by railway and telephone with Tiflis. It has an exchange committee. The water front is 22 versts (15 miles) long. It is a modern city with a mixture of Occidental and Oriental culture. It is a good market for American oil-well drilling machinery, and for pipes, belting, compressors, electric motors, and all so-called "oil-country goods."

The following table shows the shipments from Baku of the principal oil products in 1913 and 1914, together with the routes and destinations:

Oil products and years.	To interior of Russia via Caspian.	By rail.	By road (local).	To Batum.	To Persia.	Total.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Lubricating oils:						
1913	97,212	17,808	4,734	187,218	33	307,005
1914	95,950	11,584	5,387	62,731	62	175,714
Illuminating oils:						
1913	835,400	94,260	20,580	365,716	23,504	1,339,460
1914	822,327	59,839	21,281	163,562	31,256	1,098,265
Residuum:						
1913	3,014,035	120,444	13,887	75,531	2,662	3,226,559
1914	2,613,901	139,911	15,210	48,384	2,661	2,820,067
Spirits (gasoline, etc.):						
1913	587	53,029	1,001	14	73	54,704
1914	374	19,311	810	10	92	20,597
Total:						
1913	3,947,234	285,541	40,202	628,479	26,272	4,927,728
1914	3,532,552	230,645	42,688	274,687	34,071	4,114,643

Tiflis.—Capital of the Caucasus and one of the oldest settlements in the world. It is a modern city, with a population of 350,000, and is the distributing center of manufactured goods for the Caucasus and northern Persia. The turnover is about 50,000,000 rubles. There is an exchange committee. Industry is little developed, its turnover reaching 10,000,000 rubles. The most important branch is the production of cottonseed, sesame, castor, and linseed oils. Tobacco is grown in the vicinity. There are sawmills, seven or eight metal works, four large leather factories, three large soap works, brickyards, and three large oil factories.

Elisavetpol.—Administrative center of the Government of Elisavetpol. The population numbers 60,000, mostly Armenians and Tatars.

The Elisavetpol district is situated along the middle portion of the River Kura and is traversed from the east to the west by the Transcaucasian Railway. The region enjoys a very generous share of the enormous natural resources of the Caucasus. It has white and black marble, jasper, trachyte, nephrite, barytes, bauxite, aluminum, gold, cobalt, rich iron ores, petroleum, asbestos, etc., and copper ores with a content of pure copper attaining in some cases as much as 23 per cent. All these riches, owing to the lack of enterprising capital, lie undeveloped.

The cultivation of tobacco, flax and hemp, etc., forms a very important industry in the district, while cotton has recently been started at an experimental station, in response to large demands and the high price of this commodity. While the initial undertaking owes its inception to these two facts, there is little doubt that the cultivation of cotton will be continued and will undergo a rapid and substantial development. The needs of the cotton industry have required the establishment of many ginning works, some of them of considerable size and equipped with up-to-date machinery. The utilization of the oil in the cotton seed is also occupying attention and is giving rise to new undertakings.

Viticulture occupies an important section of the community, and the wines that were made in this district before the war were supplied in large quantities to the interior of Russia. The quality of the products would be much improved by the adoption of modern improvements, wine presses, and other machinery necessary for wine making. Suitable patterns of machines for this purpose would be welcomed by those engaged in the industry and would find a ready sale. Silkworm culture proves a means of subsistence for many thousands of inhabitants, but the silk industry itself is organized only on a very small scale. At present there are about 100 silk-winding and silk-twisting factories, together with about 200 small and unimportant workshops.

The mineral resources in the district are practically untouched, though worked in ancient times.

Nukha.—A town of 38,000 inhabitants and a center of the silk industry.

Shusha.—A town of 42,000 inhabitants, who are engaged in the silk and carpet industries.

Erivan.—South of the Caucasus wall, the Erivan district is situated on the extreme south of Transcaucasia and includes Lake Gok-

tcha, which has an abundant supply of fish and is also a source of hydroelectric energy for the district.

The chief town is Erivan, with a population of 30,000, on the banks of the River Zangi. The railway line connecting the town with Alexandropol, Kars, and Tiflis played an unimportant part in the commercial life of the town, but much better results have been obtained from the new line to Djulfa, which affords communication with Persia by rail to Tabriz and by highroads to Teheran, the chief markets of northern Persia.

Horticulture and fruit growing play an important part in the economic life of the population. Erivan vegetables and fruit, particularly grapes, are distributed throughout the Caucasus and even in Russia itself. In addition to this, there are many rice plantations in the vicinity. Cotton growing and brandy distillation also occupy a certain number of the inhabitants.

Alexandropol (on the Tiflis–Djulfa Railway).—Population, 53,000. Gardening and the silkworm industry are well developed.

Kars.—A town of 35,000 inhabitants, connected with Tiflis by railway. In the Kars district there are many minerals and metals that have not been exploited nor even properly investigated.

In the Poskhof section there are rich deposits of many-colored marble covering several square versts at a distance of 45 versts (30 miles) from the town of Akhaltsikh. The stone is found in horizontal strata in subterranean caves. Rock salt also is found at great depth between Olty and Kulpa. Other minerals in this region include gold, asbestos, borax, and many mineral pigments, which could be utilized for industrial purposes.

Kutais.—Population, 55,000. The Kutais region comprises the valley of the River Rion (the Phasis of the ancient Greeks) in the western Caucasus. The most important industries are the extraction of manganese and the working of timber. Manganese is found in the Tchiaturi district and in the Kvirili River villages. The sawmills produce beech staves, sleepers, deals, and logs. In this district, it is suggested by "Russia," considerable interest might be taken in the construction of rope trolleys running overhead and in the utilization of the water power of the River Rion. Two concessions have already been taken, it is stated, for overhead lines in connection with the manganese industry.

Batum (on the Black Sea).—Population, 30,000. Batum is connected by railway with Baku on the Caspian Sea. In order to facilitate the transportation of oil from the Baku fields to Batum on the Black Sea, there was constructed an important oil pipe 560 miles long. Batum has an exchange committee. The harbor has water 5 to 10 fathoms deep close to shore. The entrance is 300 fathoms deep. There are no docks but there is a breakwater for the use of petroleum steamers with 30 feet of water alongside, where five steamers can load at the same time. The one 40-ton crane is owned by the port authority. There are numerous warehouses for different kinds of merchandise.

The principal articles of import and export through the port of Batum for the years 1910 to 1914 are shown in the following table:

Articles.	1910	1911	1912	1913	1914
IMPORTS.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Cement	.....	.....	2,200	1,911	564
Chemicals	439	451	1,068	.....	344
Colonial wares (tropical products)	184	147	114	119	528
Copper, iron, cast iron, zinc, and steel	643	541	1,499	1,307	953
Copper, iron, tin, and steel wares	794	1,046	1,883	1,797	2,161
Fire bricks, clay, and tiles	4,606	6,377	5,009	5,573	4,669
Fruit, dried fruit, wines, and spirits	2,284	2,155	1,596	1,667	227
Indigo	81	133	20	.....	23
Machinery	1,443	1,884	1,956	1,719	2,403
Spelter and lead	490	363	319	491	198
Sulphate of copper	516	1,045	1,201	1,160	1,761
Sulphur	895	2,685	1,649	812	1,715
Stone and marble	364	282	275	.....	753
Tin plates	11,922	7,410	7,938	8,815	6,460
All other articles	3,073	3,023	2,244	6,575	15,792
Total imports	27,764	27,542	28,971	31,946	38,551
EXPORTS.					
Albumen and entrails	152	114	49	.....	102
Almonds, nuts, and raisins	804	2,498	731	.....	1,659
Carpets and rugs	783	943	788	734	1,059
Cotton seed	52	2,378	19,293	13,856	5,082
Grain and flour	24,791	42,992	25,391	28,047	14,867
Licorice root	10,886	15,186	15,647	24,291	10,294
Manganese ore	43,119	129,233	277,499	429,900	312,129
Oil cake	19,359	12,758	11,193	12,445	6,547
Petroleum products	645,080	595,271	545,725	624,022	300,022
Salt	192	743	1,114	1,601	.....
Seeds, grass and lucern	2,679	2,141	1,357	983	2,300
Silk, raw silk, and cocoons	1,801	1,524	1,076	1,238	325
Skins and hides	204	118	699	.....	.....
Soya beans	.....	.....	.....	.....	1,250
Tobacco	261	379	513	411	531
Wood, boxwood, walnut, chestnut, and veneer	3,916	3,961	5,062	4,491	3,586
Wool	2,080	3,793	4,264	4,492	3,921
All other articles	7,282	2,860	2,258	2,721	2,049
Total exports	763,441	816,892	912,659	1,149,235	665,714

The shipments of petroleum products through the port of Batum during the years 1912 to 1914 were as follows:

Destinations and years.	Illuminating oil.	Lubricating oil.	Crude and crude residuum.	Other petroleum products.	Total.
To foreign countries:	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*
1912	86,574,413	47,722,188	12,765,757	44,222	147,106,580
1913	95,491,505	47,869,557	13,805,900	460,906	157,627,868
1914	61,752,764	26,061,860	10,291,765	.....	98,109,389
To Russia:					
1912	7,883,505	664,323	334,580	.....	8,882,408
1913	12,63.,120	1,016,077	108,2.0	4,080	13,765,547
1914	16,037,949	241,890	298,910	.....	16,578,749
Total:					
1912	94,457,918	48,386,511	13,100,337	44,222	155,988,988
1913	108,128,625	48,885,634	13,914,170	464,986	171,393,415
1914	77,790,713	26,303,750	10,593,675	.....	114,688,138

The number of vessels of all nationalities that entered into the foreign trade of the port of Batum during 1914 was 365, with a tonnage of 609,936, as compared with 534 vessels, of 1,015,634 tons, in 1913. In 1914, British vessels took first place in tonnage (131,977 tons), followed, in order, by German (90,235 tons), Russian (85,590 tons), and French (82,341 tons).

The following particulars with regard to the Batum district were taken from "Russia" for October, 1917:

The Batum district is particularly interesting by reason of the beauty of its subtropical vegetation and its very rich natural resources. Favorable conditions of climate and soil have permitted the successful cultivation of tea in a very short time, especially near the station Tchakva, where there is also a tea factory. Tangerine trees also are grown successfully and profitably. They were brought from Japan, as were also Japanese bamboos. This cane is now growing plentifully, and workshops have been erected in this district to manufacture furniture from cane. The demand even now exceeds the supply.

The timber wealth of Batum is enormous and has been little exploited. Forests cover about one-third of the area of the Batum district, which occupies about 6,130 square versts (2,700 square miles). The forests owned by the Government cover about 250,000 dessiatines (675,000 acres). The principal trees are beech, hornbeam, ash, chestnut, spruce, pine, fir, and some oak. Particularly interesting for exploitation are the beech forests, where the trees are 150 feet high and nearly 5 feet in diameter. The beech is very good for staves, furniture, parquet floors, boards, boxes, cases, etc. The beech forests extend up to 5,500 feet above sea level, and above this altitude give place to coniferous trees, to an altitude of 7,000 feet. These include fir, spruce, and yew, the last yielding red timber, which does not rot. The minimum reserve of timber per dessiatine (2.7 acres) might be taken as equal to 30 cubic sazhens (10,300 cubic feet; about 3,800 cubic feet to the acre), half of which is suitable for building purposes and half for various other purposes.

This great wealth can not yet be exploited owing to the absence of roads. Meanwhile only valuable trees are cut down, such as walnut and box. The total area of timber exploited at present equals not more than 1/700 of the entire area of the forests, a great part of which has deteriorated owing to neglect. The production of timber in the district is lower than the demand, and considerable quantities of timber for building purposes are brought to Batum from other Russian ports (up to 1,000,000 poods and more). The Caucasus consumes a large quantity of three-ply board used for tea and fruit boxes, and nearly the whole of this comes from Pinsk through Odessa. Beech staves were formerly exported to Hamburg but not in very large quantities.

The Batum district is said to be rich in minerals. Recently many claims were registered by local people, but they have not yet been worked. Most of these claims are for copper ore, and the others are for manganese, silver-lead, marble, etc. The largest number of claims have been lodged for land situated near the basin of the River Murgul Su. The chief obstacle to the development of the mining industry in the Batum district lies in the lack of roads and railways for the transport of machinery and other materials required by the mines and for the exportation of the ore.

One of the pressing requirements of the district is the building of a railway along the River Tchorokh. There is sufficient water power for industrial purposes and possibly for electric railways.

From the port of Batum to Ardanutch the distance is 92 versts (61 miles). The cost of building an electric railway would be well covered when it began to operate. Besides mining materials for the district, there would be about 650,000 poods of marble and 100,000 poods of fire clay for building purposes, granite, etc., to be carried.

Poti (on the Black Sea).—Population, 20,000. There is anchorage for large vessels in about 10 fathoms of water 1 mile north of the lighthouse. The depth at the entrance is 28 feet, the length of quayage, 3,000 feet, and the depth alongside, 17 to 26 feet. There are only seven berths for foreign steamers. The north entrance to the harbor is now opened.

The principal articles of import and export through the port of Poti in 1912, 1913, and 1914 are shown in the following table:

Articles.	1912	1913	1914
IMPORTS.	*Tons.*	*Tons.*	*Tons.*
Cement	4,923	2,500	.....
All other articles	29	25	15
Total imports	4,952	2,525	15
EXPORTS.			
Camomile flowers	17	18	15
Corn	21,419	17,520	5,507
Flour	85	75	11
Manganese ore	634,200	649,780	415,016
Wood:			
Boxwood	400	888	98
Pine	8,000	8,300	2,860
Walnut	1,840	2,226	490
All other articles	408	165	75
Total exports	666,369	678,972	424,072

At Poti 77 vessels, of 175,551 tons, entered into the foreign trade of the port in 1914, as compared with 159 vessels, of 331,260 tons, in 1913. Most of the shipping was British and Austrian.

Sukhum (on the Black Sea).—Population, 30,000 to 35,000. This town is a center of tobacco raising. It has a bank. As a port, Sukhum is quieter than Novorossiisk and larger than Poti.

Stavropol.—Administrative center of the Stavropol Government, with a population of 60,000, situated on a branch line of the Vladikavkaz Railway. It has electric lighting and telephone service. Its inhabitants are engaged in the grain trade, the turnover being 40,000,000 rubles. There are flour mills and three breweries. The construction of a railway has been started from Stavropol to Armavir.

Present Conditions in the Caucasus.

A reliable person who left the Caucasus May 15, 1919, gives the following information:

A former American consul in Tiflis has organized a corporation of $1,000,000 to encourage the exportation of goods from the Caucasus to the United States and the importation of American goods to the Caucasus. The Armenian merchants of Tiflis have already subscribed $750,000 and the American is to provide the other $250,000. The Armenian merchants will assemble goods in Tiflis for exportation to the United States, and the American will arrange purchases

and transportation of American goods in the United States. Recently orders were obtained by the new corporation for $1,000,000 worth of American goods. The arrangement is a matter of barter, and this is the only possible way of conducting business between the Caucasus and the United States at present because of the depreciation in the value of the ruble. There are in circulation newly printed Georgian rubles, which are much depreciated, 40 rubles being equal to the dollar.

British textiles are already arriving in the Caucasus. There is a regular line of British ships between England and Batum, and French goods reach Batum through the regular French steamship lines from Marseille. There are already awaiting shipment in Batum large quantities of tobacco, wool, manganese ore, oil, and caviar.

The port of Batum provides adequate shipping facilities for any normal development in trade. There are regular lines between Batum and Novorossiisk.

The agricultural possibilities in the Caucasus have not yet been touched. Thousands of acres of the finest land for wheat and corn have never been planted. Large tracts of land that could be cultivated by machinery can be obtained at a small rental. The country is well adapted to the growth of fruit. Apples of an excellent quality are grown all through this region. Large grazing interests could be developed in the Caucasus.

The railroad beds are in excellent condition at the present time. The rolling stock is in surprisingly good condition in view of the strain that has been put upon it by the war. The mines are working and there is a fairly large supply of mineral products on hand for exportation.

Labor is in a disturbed state on account of the low wages paid and the great depreciation of the ruble. It seems almost impossible that people in these cities are able to live. All wearing apparel is very high; for instance, a suit of clothes costs 4,000 rubles (at the present rate of exchange, $100), a pair of shoes costs $25 to $30, and other articles are proportionately high.

At present (September, 1919) three so-called Republics have their seats of government in Transcaucasia: Georgia, with Tiflis as its capital; Azerbaijan, with its capital at Baku; and Armenia, with Erivan as its capital. There is also a military sphere in charge of the British, with Batum as its center. The Tatars and Mohammedans are large merchants in the Azerbaijan section. The Russian portion (Erivan) of the "Republic of Armenia" has excellent water-power possibilities. At present freight transportation is being hindered by the customs duties and other taxes imposed at the frontiers of the "de facto" governments.

[The following articles on the Caucasus have been published recently in COMMERCE REPORTS: July 2—Insurance available for British trade with Russia; July 7—The southeastern district of Russia; July 14—Recent trading with South Russia; July 15—Exchange of goods with the Caucasus; July 17—Customs charges in Transcaucasia; July 22—Facilitating British trade with Russia; August 16—Manganese industry of Transcaucasia; September 26—Government export monopoly in Transcaucasia; October 8—Polish commercial mission to southeastern Russia; October 9—Capacity of Batum oil wells.

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